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Report No. 04680-6-NS

MODELPROEFRESULTATEN

Deel II

September 1988.

DEEL II: MODELPROEFRESULTATEN.

MARIN opdracht No.: M 04680-D

Scheepsmodel No. 2489

Modelschaal : $\lambda = 25$

Opdrachtgever: Rijkswaterstaat
Dienst Verkeerskunde
Hoofdafdeling Scheepvaart
Postbus 494
3300 AL DORDRECHT

Overeenkomst No's: DVK-344, DVK-344 A, DVK-344 B.

Samengesteld door: Ing. A. Rem en P.A.A. Keukens
Goedgekeurd door : Ir. J.J. Muntjewerf

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1 TEN GELEIDE

Dit rapport bevat uitsluitend de resultaten van de modelproeven uitgevoerd met het Rijn-Herne-Kanaal schip. Voor een beschrijving van het RHK-schip, het proevenprogramma, de analyse van de modelproefresultaten, enz. wordt verwezen naar Rapport 04680-6-NS (DEEL I).

Wageningen, september 1988.

MARITIEM RESEARCH INSTITUUT NEDERLAND



1/0

Ir. J.J. Muntjewerf
Vice President

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BELADEN, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FX	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
1	119.	260506.	1.51	127.2	-15.9	-49.4	-7.	80.	2346.
2	118.	260505.	1.51	127.3	-15.9	-29.6	1.	84.	2264.
3	117.	260504.	1.51	127.3	-15.9	-9.7	2.	97.	1939.
4	171.	258702.	1.51	127.4	-16.1	-1.	-1.	108.	1943.
5	116.	260503.	1.50	127.7	-15.9	10.0	2.	117.	1497.
6	115.	260502.	1.50	127.4	-15.9	29.6	-4.	129.	1222.
7	114.	260501.	1.50	127.2	-15.9	49.8	-12.	140.	804.
8	164.	258602.	1.50	127.5	-12.0	-1.	1.	55.	1051.
9	83.	259909.	1.50	127.3	-7.9	-49.5	-11.	14.	1407.
10	82.	259908.	1.50	126.7	-7.9	-29.9	-9.	19.	1334.
11	81.	259907.	1.50	126.9	-7.9	-9.9	-1.	32.	1031.
12	157.	258502.	1.49	127.5	-8.0	-1.	-2.	42.	929.
13	80.	259906.	1.50	127.2	-7.9	9.9	-2.	48.	490.
14	79.	259905.	1.51	127.2	-7.9	29.6	-9.	56.	355.
15	78.	259904.	1.51	127.4	-7.9	49.3	-17.	72.	-177.
16	150.	258402.	1.48	127.8	-4.0	1.	2.	15.	304.
17	1.	254401.	1.50	128.6	0.	49.3	-9.	15.	-524.
18	11.	254411.	1.50	128.4	0.	-49.4	-8.	-26.	674.
19	10.	254410.	1.49	129.9	0.	-39.8	0.	-14.	403.
20	9.	254409.	1.50	129.6	0.	-30.1	0.	-12.	442.
21	8.	254408.	1.50	129.4	0.	-20.1	3.	-10.	232.
22	7.	254407.	1.50	128.9	0.	-10.1	-1.	-5.	287.
23	6.	254406.	1.50	128.8	0.	1.	2.	-3.	-14.
24	5.	254405.	1.49	128.8	0.	10.1	2.	1.	-40.
25	4.	254404.	1.50	128.6	0.	19.7	0.	5.	-195.
26	3.	254403.	1.50	128.7	0.	29.4	2.	12.	-248.
27	2.	254402.	1.50	128.6	0.	39.4	-5.	16.	-419.
28	178.	258802.	1.49	127.5	4.0	0.	-3.	-17.	-408.
29	185.	258902.	1.49	127.4	8.0	0.	-2.	-43.	-786.
30	192.	259002.	1.50	127.6	12.0	0.	-1.	-61.	-1165.
31	199.	259102.	1.50	127.4	16.0	0.	5.	-115.	-1659.
32	125.	260606.	1.50	240.2	-16.0	-49.3	4.	57.	3395.
33	124.	260605.	1.50	239.8	-16.0	-29.7	23.	76.	2651.
34	123.	260604.	1.50	239.7	-16.0	-9.8	32.	102.	2307.
35	122.	260603.	1.51	239.6	-16.0	10.0	28.	125.	1354.
36	121.	260602.	1.50	240.0	-16.0	29.7	20.	143.	698.
37	120.	260601.	1.50	239.8	-16.0	49.6	-2.	167.	-154.
38	89.	260006.	1.50	238.1	-8.1	-49.3	-4.	-15.	2389.
39	88.	260005.	1.50	237.2	-8.1	-29.7	17.	15.	1621.
40	87.	260004.	1.50	237.3	-8.1	-9.7	22.	31.	1122.
41	86.	260003.	1.50	238.7	-8.1	10.0	23.	54.	282.
42	85.	260002.	1.50	238.1	-8.1	29.7	12.	76.	-222.
43	84.	260001.	1.51	238.8	-8.1	49.5	-8.	95.	-1060.
44	12.	254412.	1.50	241.2	0.	2.	24.	-3.	55.
45	131.	260706.	1.51	417.9	-16.0	-49.3	35.	-9.	5473.
46	130.	260705.	1.51	418.2	-16.0	-29.8	96.	58.	3157.
47	129.	260704.	1.50	417.8	-16.0	-9.7	117.	113.	2213.
48	172.	258703.	1.51	418.2	-16.1	-1.	115.	127.	1680.
49	128.	260703.	1.51	417.7	-16.0	10.0	114.	164.	560.
50	127.	260702.	1.50	417.8	-16.0	29.7	84.	217.	-1150.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BELADEN, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FX	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
51	126.	260701.	1.50	417.6	-16.0	49.3	27.	275.	-2905.
52	165.	258603.	1.50	418.8	-11.9	-1.	116.	88.	1051.
53	95.	260106.	1.50	418.8	-8.0	-49.1	31.	-86.	4666.
54	94.	260105.	1.50	418.0	-8.0	-29.5	92.	-16.	2526.
55	93.	260104.	1.50	417.8	-8.0	-9.5	109.	25.	1380.
56	158.	258503.	1.49	418.0	-8.0	-1.	114.	58.	548.
57	92.	260103.	1.50	417.9	-8.0	10.2	109.	69.	-219.
58	91.	260102.	1.50	418.4	-8.0	30.0	83.	134.	-1867.
59	90.	260101.	1.50	418.5	-8.0	49.8	22.	193.	-3913.
60	151.	258403.	1.48	418.4	-4.1	.1	111.	21.	225.
61	20.	254508.	1.49	421.4	.0	-19.8	98.	-41.	1459.
62	19.	254507.	1.49	420.6	.0	-9.9	106.	-21.	793.
63	18.	254506.	1.48	422.2	.0	-1.	106.	2.	103.
64	17.	254505.	1.49	421.7	.0	9.9	105.	20.	-621.
65	16.	254504.	1.48	421.5	.0	19.8	97.	36.	-1126.
66	15.	254503.	1.49	421.7	.0	29.5	83.	70.	-2269.
67	14.	254502.	1.50	421.4	.0	39.7	43.	121.	-3904.
68	13.	254501.	1.50	421.0	.0	49.5	13.	148.	-4592.
69	23.	254511.	1.48	420.6	.0	-49.5	20.	-125.	4014.
70	22.	254510.	1.48	421.2	.0	-39.6	53.	-107.	3539.
71	21.	254509.	1.49	422.0	.0	-29.7	84.	-69.	2278.
72	179.	258803.	1.49	418.4	4.0	.0	105.	-25.	-336.
73	186.	258903.	1.50	418.2	8.0	.0	101.	-53.	-674.
74	193.	259003.	1.49	418.3	12.0	.0	101.	-88.	-1014.
75	200.	259103.	1.49	418.5	16.0	.0	101.	-144.	-1426.
76	173.	258704.	2.26	127.4	-16.1	-1.	-9.	254.	4021.
77	166.	258604.	2.25	127.4	-11.9	-1.	-7.	164.	3014.
78	159.	258504.	2.25	127.5	-8.0	-1.	-14.	90.	1997.
79	152.	258404.	2.25	127.4	-4.0	.1	-13.	29.	895.
80	180.	258804.	2.25	127.5	4.0	-1.	-12.	-27.	-704.
81	187.	258904.	2.25	127.3	8.0	.0	-10.	-82.	-1806.
82	194.	259004.	2.25	127.5	12.0	.0	-12.	-152.	-2760.
83	201.	259104.	2.25	127.9	16.0	.0	3.	-255.	-3651.
84	174.	258705.	2.26	239.4	-16.1	-1.	16.	247.	4229.
85	167.	258605.	2.24	239.8	-11.9	-1.	17.	155.	2908.
86	160.	258505.	2.25	239.8	-8.0	-1.	14.	84.	1879.
87	153.	258405.	2.24	239.3	-4.0	.1	12.	36.	942.
88	181.	258805.	2.25	239.8	4.0	-1.	6.	-23.	-915.
89	188.	258905.	2.24	239.9	8.0	.0	12.	-83.	-1718.
90	195.	259005.	2.25	240.7	12.0	-1.	15.	-161.	-2658.
91	202.	259105.	2.26	240.8	16.0	.0	18.	-248.	-3842.
92	175.	258706.	2.26	417.9	-16.1	-1.	99.	263.	4152.
93	168.	258606.	2.25	418.5	-11.8	-1.	95.	161.	2738.
94	161.	258506.	2.25	418.3	-8.0	-1.	97.	77.	1917.
95	154.	258406.	2.25	418.6	-4.0	.1	94.	32.	743.
96	182.	258806.	2.25	418.5	4.0	-1.	85.	-25.	-770.
97	189.	258906.	2.25	418.2	8.0	.0	85.	-87.	-1678.
98	196.	259006.	2.25	418.1	12.0	-1.	81.	-156.	-2473.
99	203.	259106.	2.26	418.6	16.0	.0	95.	-261.	-3556.
100	137.	260806.	3.01	127.2	-16.0	-49.3	-70.	477.	13413.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BELADEN, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FX	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
101	136.	260805.	3.00	127.4	-16.0	-29.7	-59.	512.	13861.
102	135.	260804.	3.00	127.3	-16.0	-9.7	-51.	570.	13317.
103	176.	258707.	2.99	127.4	-16.1	-1.	-38.	532.	10212.
104	134.	260803.	3.01	127.2	-16.0	10.0	-58.	613.	12000.
105	133.	260802.	3.01	127.1	-16.0	29.8	-54.	631.	10343.
106	132.	260801.	3.00	127.2	-16.0	49.5	-72.	601.	8624.
107	169.	258607.	3.01	127.3	-12.1	-1.	-42.	320.	6376.
108	101.	260206.	3.01	127.3	-8.0	-49.4	-60.	105.	5372.
109	100.	260205.	3.00	127.8	-8.0	-29.7	-45.	123.	5107.
110	99.	260204.	3.01	127.5	-8.0	-9.8	-46.	160.	4450.
111	162.	258507.	3.00	127.4	-8.0	1.	-36.	161.	3651.
112	98.	260203.	3.00	127.4	-8.0	10.0	-48.	192.	3717.
113	97.	260202.	3.00	127.5	-8.0	29.8	-50.	212.	2789.
114	96.	260201.	3.00	127.3	-8.0	49.5	-53.	212.	1821.
115	155.	258407.	3.01	127.3	-4.0	1.	-37.	58.	1897.
116	34.	254611.	2.97	128.2	0.	-49.4	-41.	-27.	1412.
117	33.	254610.	2.98	128.1	0.	-39.6	-32.	-28.	1244.
118	32.	254609.	2.98	128.0	0.	-29.7	-27.	-24.	1086.
119	31.	254608.	2.98	128.1	0.	-20.0	-24.	-8.	814.
120	30.	254607.	2.99	128.2	0.	-9.9	-24.	1.	507.
121	29.	254606.	2.98	128.2	0.	-1.	-27.	4.	403.
122	28.	254605.	2.99	128.0	0.	9.9	-27.	7.	11.
123	27.	254604.	2.99	128.1	0.	19.9	-27.	19.	-261.
124	26.	254603.	2.98	128.8	0.	29.7	-31.	20.	-525.
125	25.	254602.	2.99	128.3	0.	39.6	-34.	32.	-804.
126	24.	254601.	2.99	128.2	0.	49.4	-42.	40.	-955.
127	183.	258808.	3.01	127.4	4.0	0.	-31.	-46.	-1452.
128	190.	258907.	2.99	127.6	7.9	0.	-27.	-142.	-3186.
129	197.	259007.	3.02	127.5	12.0	0.	-30.	-301.	-5734.
130	204.	259107.	3.01	127.5	16.0	0.	-32.	-543.	-10034.
131	143.	260906.	3.01	240.7	-16.0	-49.4	-71.	441.	14970.
132	142.	260905.	3.01	240.6	-16.0	-29.8	-37.	481.	14370.
133	141.	260904.	3.01	240.1	-16.0	-9.7	-27.	539.	13689.
134	140.	260903.	3.00	239.7	-16.0	10.0	-30.	597.	12011.
135	139.	260902.	3.00	239.5	-16.0	29.7	-37.	680.	10964.
136	138.	260901.	3.00	239.6	-16.0	49.5	-64.	701.	8758.
137	107.	260306.	3.00	239.9	-7.9	-49.4	-48.	64.	6494.
138	106.	260305.	3.01	240.3	-7.9	-29.7	-23.	96.	5755.
139	105.	260304.	3.00	240.0	-7.9	-9.8	-15.	159.	4814.
140	104.	260303.	3.00	239.7	-7.9	10.0	-20.	186.	3421.
141	103.	260302.	3.00	239.5	-7.9	29.7	-30.	233.	2278.
142	102.	260301.	2.99	239.5	-7.9	49.7	-61.	268.	658.
143	45.	254711.	2.98	239.7	0.	-49.5	-34.	-69.	2483.
144	44.	254710.	2.98	240.3	0.	-39.5	-22.	-60.	2001.
145	43.	254709.	2.98	240.4	0.	-29.7	-15.	-43.	1602.
146	42.	254708.	2.98	239.4	0.	-19.9	-5.	-24.	1102.
147	41.	254707.	2.99	239.5	0.	-9.9	-4.	-11.	641.
148	35.	254701.	2.98	239.2	0.	49.7	-49.	87.	-2191.
149	40.	254706.	2.98	240.6	0.	2.	2.	5.	225.
150	39.	254705.	2.99	240.9	0.	10.2	-5.	12.	-179.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BELADEN, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FX	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
151	38.	254704.	2.99	240.5	.0	20.0	-6.	31.	-532.
152	37.	254703.	2.99	241.0	.0	29.7	-12.	39.	-1136.
153	36.	254702.	2.99	240.3	.0	39.7	-28.	78.	-1936.
154	149.	261006.	3.00	418.7	-16.0	-49.3	-44.	348.	17125.
155	148.	261005.	3.01	418.2	-16.0	-29.8	20.	449.	15702.
156	147.	261004.	3.01	418.1	-16.0	-9.8	48.	520.	13967.
157	177.	258708.	3.00	418.5	-16.1	-1.	57.	511.	10704.
158	146.	261003.	3.01	418.2	-16.0	10.0	48.	631.	12076.
159	145.	261002.	3.00	418.6	-16.0	29.7	24.	726.	9557.
160	144.	261001.	3.00	417.9	-16.0	49.6	-58.	795.	6001.
161	170.	258609.	3.00	418.1	-12.1	-1.	47.	314.	6783.
162	113.	260406.	3.01	418.4	-8.1	-49.4	-27.	-11.	9367.
163	112.	260405.	3.00	419.0	-8.0	-29.8	36.	68.	6810.
164	111.	260404.	3.00	418.9	-8.0	-9.8	63.	126.	5369.
165	163.	258508.	3.00	418.5	-8.0	.1	63.	159.	3451.
166	110.	260403.	3.00	418.6	-8.0	10.0	54.	203.	2721.
167	109.	260402.	2.99	418.0	-8.0	29.7	19.	296.	443.
168	108.	260401.	2.99	418.4	-8.0	49.6	-42.	350.	-2447.
169	156.	258408.	3.00	418.1	-4.1	.1	61.	58.	1946.
170	51.	254806.	2.99	419.8	.0	.1	79.	5.	324.
171	50.	254805.	2.98	421.0	.0	10.2	77.	22.	-692.
172	49.	254804.	2.98	420.6	.0	20.0	69.	47.	-1477.
173	48.	254803.	2.98	420.6	.0	29.8	43.	94.	-2823.
174	47.	254802.	2.99	419.9	.0	39.6	4.	157.	-4722.
175	46.	254801.	2.98	419.7	.0	48.2	-29.	178.	-5664.
176	56.	254811.	2.98	422.7	.0	-49.2	-22.	-163.	5527.
177	55.	254810.	2.98	422.2	.0	-39.3	13.	-124.	4677.
178	54.	254809.	2.99	422.2	.0	-29.5	46.	-88.	3158.
179	53.	254808.	2.98	421.8	.0	-19.6	64.	-50.	1882.
180	52.	254807.	2.98	421.8	.0	-9.7	68.	-21.	1215.
181	184.	258809.	3.01	418.1	4.0	.0	62.	-48.	-1610.
182	191.	258908.	3.00	418.6	7.9	.0	54.	-158.	-3199.
183	198.	259008.	3.00	418.7	12.0	.0	57.	-319.	-5967.
184	205.	259108.	3.00	418.6	16.0	.0	63.	-539.	-10274.
185	67.	254911.	4.31	128.4	.0	-49.2	-104.	-30.	1870.
186	66.	254910.	4.31	128.4	.0	-39.2	-98.	-22.	1645.
187	65.	254909.	4.31	128.3	.0	-29.5	-85.	-25.	1490.
188	64.	254908.	4.31	128.6	.0	-19.6	-96.	-1.	1132.
189	63.	254907.	4.31	128.9	.0	-9.7	-84.	12.	655.
190	62.	254906.	4.31	128.6	.0	.4	-90.	19.	462.
191	61.	254905.	4.30	128.5	.0	10.2	-89.	22.	393.
192	60.	254904.	4.29	128.5	.0	20.0	-97.	30.	-28.
193	59.	254903.	4.29	128.5	.0	29.9	-106.	47.	-354.
194	58.	254902.	4.30	128.6	.0	39.8	-106.	55.	-743.
195	57.	254901.	4.29	128.2	.0	49.7	-132.	65.	-928.
196	206.	254912.	4.30	240.8	.0	.3	-67.	20.	598.
197	207.	255012.	4.30	422.1	.0	-39.5	-66.	-141.	5496.
198	76.	255009.	4.30	421.0	.0	-29.8	-12.	-76.	3511.
199	74.	255007.	4.30	422.6	.0	-10.0	16.	-20.	1248.
200	72.	255005.	4.28	423.7	.0	9.9	1.	30.	-232.

DVK Project Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BELADEN, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FX	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
201	71.	255004.	4.28	422.8	.0	20.0	-4.	60.	-1350.
202	70.	255003.	4.28	422.1	.0	29.7	-35.	127.	-2843.
203	68.	255001.	4.29	421.5	.0	49.5	-111.	251.	-6889.
204	77.	255011.	4.29	420.4	.0	-49.2	-103.	-182.	6633.
205	75.	255008.	4.30	421.9	.0	-19.9	-4.	-39.	2380.
206	73.	255006.	4.29	421.1	.0	.0	26.	20.	549.
207	69.	255002.	4.28	422.4	.0	39.8	-74.	209.	-5773.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BALLAST, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FXC	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
1	43.	262802.	2.25	112.4	-16.0	.0	-9.	29.	-65.
2	36.	262702.	2.26	112.7	-12.0	.0	-2.	25.	-101.
3	29.	262602.	2.25	113.0	-8.0	.0	0.	14.	-43.
4	22.	262502.	2.25	112.5	-4.1	.0	-2.	6.	-10.
5	128.	264206.	2.26	113.2	.0	.0	2.	0.	25.
6	123.	264201.	2.25	112.0	.0	50.1	-13.	17.	-670.
7	133.	264211.	2.26	112.9	.0	-48.9	-11.	-22.	709.
8	132.	264210.	2.27	113.1	.0	-39.1	-4.	-16.	653.
9	131.	264209.	2.26	112.8	.0	-29.4	-9.	-10.	463.
10	130.	264208.	2.26	112.5	.0	-19.6	-4.	-11.	384.
11	129.	264207.	2.26	112.6	.0	-9.7	2.	-9.	242.
12	127.	264205.	2.26	113.5	.0	10.2	-3.	6.	-144.
13	126.	264204.	2.25	112.8	.0	20.2	-3.	7.	-318.
14	125.	264203.	2.25	112.1	.0	30.2	-7.	7.	-450.
15	124.	264202.	2.25	112.4	.0	40.2	-9.	13.	-573.
16	50.	262902.	2.22	112.4	4.0	.0	-4.	-5.	19.
17	62.	263007.	2.26	113.7	8.0	-48.9	-20.	-33.	842.
18	61.	263006.	2.26	113.7	8.0	-29.4	-11.	-25.	784.
19	60.	263005.	2.26	114.0	8.0	-9.6	2.	-15.	316.
20	1.	262201.	2.26	112.6	8.0	.0	-4.	-15.	143.
21	59.	263004.	2.26	113.3	8.0	10.2	-5.	-4.	-179.
22	58.	263003.	2.25	113.6	8.0	30.3	-8.	4.	-538.
23	57.	263002.	2.25	113.8	8.0	50.2	-14.	7.	-632.
24	8.	262302.	2.24	112.4	12.0	.0	-2.	-19.	7.
25	92.	263607.	2.26	113.9	16.0	-48.9	-15.	-52.	1129.
26	91.	263606.	2.26	112.9	16.0	-29.4	-8.	-50.	938.
27	90.	263605.	2.26	113.3	16.0	-9.6	-3.	-42.	489.
28	15.	262402.	2.25	112.5	16.0	.0	-9.	-25.	142.
29	89.	263604.	2.26	113.2	16.0	10.2	-5.	-23.	-66.
30	88.	263603.	2.25	113.0	16.0	30.1	-6.	-15.	-386.
31	87.	263602.	2.26	113.1	16.0	50.1	-18.	-14.	-583.
32	134.	264212.	2.25	216.4	.0	.0	16.	2.	29.
33	73.	263106.	2.26	218.7	8.0	-49.0	-18.	-49.	1560.
34	67.	263105.	2.26	218.8	8.0	-29.4	10.	-41.	1179.
35	66.	263104.	2.26	218.3	8.0	-9.7	6.	-22.	405.
36	65.	263103.	2.25	217.3	8.0	10.2	12.	-4.	-192.
37	64.	263102.	2.26	217.6	8.0	30.2	7.	13.	-810.
38	63.	263101.	2.25	217.4	8.0	50.0	-15.	25.	-1303.
39	98.	263706.	2.25	217.7	16.0	-48.9	-9.	-74.	1763.
40	97.	263705.	2.25	217.8	16.0	-29.4	1.	-67.	1355.
41	96.	263704.	2.25	218.2	16.0	-9.6	15.	-43.	661.
42	95.	263703.	2.24	217.9	16.0	10.2	14.	-22.	-57.
43	94.	263702.	2.24	217.4	16.0	30.2	8.	-9.	-704.
44	93.	263701.	2.24	217.1	16.0	50.1	-14.	7.	-1213.
45	44.	262803.	2.25	325.3	-16.0	.0	55.	35.	-396.
46	37.	262703.	2.26	325.1	-12.0	.0	56.	26.	-250.
47	30.	262603.	2.24	325.4	-8.0	.0	58.	20.	-197.
48	23.	262503.	2.26	325.4	-4.1	.0	58.	7.	-29.
49	142.	264224.	2.26	326.2	.0	-19.8	51.	-29.	1033.
50	145.	264227.	2.25	325.8	.0	-49.1	12.	-60.	2471.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BALLAST, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FXC	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
51	144.	264226.	2.25	326.2	.0	-39.2	36.	-49.	2016.
52	143.	264225.	2.26	326.0	.0	-29.6	46.	-34.	1391.
53	141.	264223.	2.26	325.1	.0	-9.8	51.	-16.	568.
54	140.	264222.	2.25	325.6	.0	-1	55.	-2.	50.
55	139.	264221.	2.25	325.6	.0	10.0	59.	9.	-400.
56	138.	264220.	2.25	325.1	.0	20.0	50.	25.	-949.
57	137.	264219.	2.25	324.9	.0	30.0	44.	42.	-1520.
58	136.	264218.	2.25	325.4	.0	40.2	19.	51.	-2105.
59	135.	264213.	2.25	325.7	.0	50.0	6.	68.	-2654.
60	51.	262903.	2.23	325.2	4.0	.0	56.	-5.	13.
61	74.	263206.	2.26	325.3	8.0	-49.0	2.	-75.	2672.
62	72.	263205.	2.26	325.6	8.0	-29.4	39.	-57.	1807.
63	71.	263204.	2.26	325.1	8.0	-9.6	51.	-30.	713.
64	2.	262202.	2.26	325.6	8.0	.0	50.	-12.	93.
65	70.	263203.	2.25	328.1	8.0	10.2	51.	1.	-292.
66	69.	263202.	2.25	327.5	8.0	30.1	37.	30.	-1536.
67	68.	263201.	2.25	325.9	8.0	50.2	0.	52.	-2395.
68	9.	262303.	2.24	325.0	12.0	.0	49.	-25.	196.
69	104.	263806.	2.26	326.7	16.0	-48.9	1.	-97.	2796.
70	103.	263805.	2.26	327.2	16.0	-29.4	30.	-85.	2138.
71	102.	263804.	2.25	325.7	16.0	-9.6	46.	-56.	1028.
72	16.	262403.	2.24	325.5	16.0	.0	49.	-35.	368.
73	101.	263803.	2.24	325.6	16.0	10.2	48.	-25.	-115.
74	100.	263802.	2.25	325.9	16.0	30.2	36.	5.	-1265.
75	99.	263801.	2.25	325.3	16.0	50.1	3.	31.	-2281.
76	45.	262804.	3.53	112.6	-16.0	.0	-32.	67.	-354.
77	38.	262704.	3.52	112.7	-12.0	.0	-7.	46.	-214.
78	31.	262604.	3.48	112.8	-8.0	.0	-19.	28.	-13.
79	24.	262504.	3.52	112.7	-4.1	.0	-16.	16.	-16.
80	156.	264311.	3.53	112.9	.0	-48.9	-18.	-30.	1254.
81	155.	264310.	3.53	112.9	.0	-39.0	-7.	-25.	1212.
82	154.	264309.	3.53	113.1	.0	-29.3	-14.	-17.	1129.
83	153.	264308.	3.52	112.7	.0	-19.5	-9.	-13.	705.
84	152.	264307.	3.52	112.4	.0	-9.6	-19.	-5.	315.
85	151.	264306.	3.51	113.4	.0	.2	-24.	6.	-118.
86	150.	264305.	3.52	113.1	.0	10.4	-25.	17.	-532.
87	149.	264304.	3.52	112.8	.0	20.4	-23.	19.	-555.
88	148.	264303.	3.52	112.6	.0	30.3	-18.	26.	-926.
89	147.	264302.	3.51	112.4	.0	40.2	-24.	33.	-967.
90	146.	264301.	3.51	112.3	.0	50.4	-37.	31.	-1090.
91	52.	262904.	3.49	112.5	4.0	.0	-24.	-10.	-33.
92	3.	262203.	3.52	112.8	8.0	.0	-18.	-23.	104.
93	10.	262304.	3.50	112.4	12.0	.0	-23.	-41.	-14.
94	17.	262404.	3.50	112.7	16.0	.0	-25.	-64.	280.
95	46.	262805.	3.52	216.6	-16.0	.0	-1.	65.	-336.
96	39.	262705.	3.52	217.3	-12.0	.0	0.	47.	-110.
97	32.	262605.	3.50	217.2	-8.0	.0	-2.	30.	-54.
98	25.	262505.	3.51	217.4	-4.1	.0	7.	15.	-22.
99	167.	264411.	3.52	218.3	.0	-48.9	-37.	-39.	1766.
100	166.	264410.	3.53	217.7	.0	-39.1	-8.	-39.	1717.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BALLAST, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FXC	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
101	165.	264409.	3.52	217.2	.0	-29.4	-8.	-32.	1452.
102	164.	264408.	3.52	217.1	.0	-19.5	5.	-21.	934.
103	163.	264407.	3.52	216.9	.0	-9.6	5.	-9.	581.
104	160.	264404.	3.52	218.0	.0	20.0	7.	25.	-696.
105	159.	264403.	3.52	217.4	.0	30.0	-8.	39.	-1352.
106	158.	264402.	3.52	216.7	.0	40.1	-4.	42.	-1543.
107	162.	264406.	3.52	217.1	.0	.0	13.	2.	-12.
108	161.	264405.	3.52	218.1	.0	10.0	-1.	15.	-575.
109	157.	264401.	3.52	217.0	.0	49.9	-25.	51.	-1950.
110	53.	262905.	3.50	217.3	4.0	.0	-7.	-11.	33.
111	4.	262204.	3.53	217.1	8.0	.0	-10.	-23.	211.
112	11.	262305.	3.49	217.1	12.0	.0	-10.	-42.	212.
113	18.	262405.	3.49	216.9	16.0	.0	-10.	-66.	425.
114	47.	262806.	3.52	325.6	-16.2	.0	35.	64.	-325.
115	40.	262706.	3.51	325.1	-12.0	.0	37.	49.	-325.
116	33.	262606.	3.51	325.4	-8.0	.0	38.	24.	-101.
117	26.	262506.	3.51	325.0	-4.1	.0	45.	11.	8.
118	178.	264511.	3.52	325.8	.0	-48.9	-21.	-65.	2915.
119	177.	264510.	3.53	325.5	.0	-39.1	2.	-59.	2236.
120	176.	264509.	3.52	325.5	.0	-29.4	6.	-39.	1894.
121	175.	264508.	3.52	325.4	.0	-19.5	29.	-29.	1330.
122	174.	264507.	3.52	325.1	.0	-9.6	37.	-14.	687.
123	173.	264506.	3.52	327.5	.0	.2	47.	0.	81.
124	172.	264505.	3.53	326.4	.0	10.2	38.	19.	-533.
125	171.	264504.	3.51	326.8	.0	20.2	49.	34.	-1291.
126	170.	264503.	3.52	326.0	.0	30.2	11.	58.	-1983.
127	169.	264502.	3.52	326.1	.0	40.5	8.	69.	-2440.
128	168.	264501.	3.52	325.8	.0	50.0	-21.	80.	-3123.
129	54.	262906.	3.49	325.4	4.0	.0	33.	-8.	38.
130	5.	262205.	3.53	325.2	8.0	.0	40.	-26.	245.
131	12.	262307.	3.51	325.3	12.0	.0	27.	-42.	488.
132	19.	262406.	3.49	325.6	16.0	.0	29.	-69.	499.
133	48.	262808.	4.78	112.8	-16.0	.0	-60.	126.	-622.
134	41.	262707.	4.76	112.6	-12.0	.0	-54.	83.	-46.
135	34.	262608.	4.77	112.7	-8.0	.0	-45.	52.	45.
136	27.	262507.	4.77	112.8	-4.1	.0	-41.	25.	88.
137	189.	264611.	4.77	113.8	.0	-48.9	-66.	-47.	1936.
138	188.	264610.	4.78	113.6	.0	-39.1	-55.	-43.	1925.
139	187.	264609.	4.78	113.4	.0	-29.4	-45.	-35.	1579.
140	186.	264608.	4.77	112.9	.0	-19.5	-40.	-20.	1056.
141	185.	264607.	4.76	112.2	.0	-9.6	-38.	-14.	555.
142	184.	264606.	4.76	111.9	.0	.2	-37.	3.	125.
143	183.	264605.	4.76	112.4	.0	10.3	-39.	19.	-446.
144	182.	264604.	4.76	110.9	.0	20.2	-34.	26.	-861.
145	181.	264603.	4.76	111.4	.0	30.3	-39.	44.	-1330.
146	180.	264602.	4.75	111.7	.0	40.3	-47.	45.	-1503.
147	179.	264601.	4.75	111.8	.0	50.2	-47.	47.	-1420.
148	55.	262907.	4.76	113.0	4.0	.0	-41.	-14.	-28.
149	207.	263306.	4.76	112.3	8.0	-48.9	-82.	-109.	2471.
150	206.	263305.	4.76	112.3	8.0	-29.3	-61.	-100.	2149.

DVK Projekt Windhinder

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BALLAST, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FXC	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
151	205.	263304.	4.77	112.5	8.0	-9.7	-53.	-69.	796.
152	6.	262206.	4.76	112.7	8.0	.0	-48.	-46.	187.
153	204.	263303.	4.76	112.2	8.0	10.1	-47.	-32.	-536.
154	203.	263302.	4.76	112.1	8.0	30.2	-54.	-4.	-1507.
155	202.	263301.	4.76	111.9	8.0	50.1	-73.	8.	-1819.
156	13.	262308.	4.77	112.8	12.0	.0	-51.	-77.	275.
157	110.	263907.	4.78	112.1	16.0	-48.9	-84.	-191.	3232.
158	109.	263906.	4.77	112.2	16.0	-29.3	-73.	-178.	2809.
159	108.	263905.	4.75	112.4	16.0	-9.7	-59.	-143.	1534.
160	20.	262407.	4.74	112.3	16.0	.0	-57.	-123.	719.
161	107.	263904.	4.77	114.1	16.0	10.2	-55.	-108.	178.
162	106.	263903.	4.77	112.9	16.0	30.3	-65.	-78.	-951.
163	105.	263902.	4.76	112.2	16.0	50.2	-83.	-63.	-1563.
164	190.	264701.	4.77	216.9	.0	-.2	-27.	2.	121.
165	80.	263406.	4.76	217.1	8.0	-49.1	-72.	-123.	3185.
166	79.	263405.	4.77	217.2	8.0	-29.6	-55.	-119.	2890.
167	78.	263404.	4.76	216.7	8.0	-9.9	-35.	-70.	1145.
168	77.	263403.	4.77	217.3	8.0	10.2	-32.	-24.	-559.
169	76.	263402.	4.78	216.8	8.0	30.2	-40.	8.	-1895.
170	75.	263401.	4.77	216.4	8.0	50.0	-74.	29.	-2595.
171	116.	264006.	4.78	217.3	15.9	-47.9	-90.	-241.	4705.
172	115.	264005.	4.78	217.4	15.9	-29.4	-71.	-218.	3902.
173	114.	264004.	4.77	217.1	15.9	-9.7	-48.	-149.	1902.
174	113.	264003.	4.78	218.1	15.9	10.2	-42.	-99.	-154.
175	112.	264002.	4.77	218.0	15.9	30.2	-55.	-62.	-1555.
176	111.	264001.	4.77	217.8	15.9	50.2	-78.	-44.	-2309.
177	49.	262809.	4.76	325.5	-16.0	.0	-15.	128.	-691.
178	42.	262708.	4.77	325.5	-12.0	.0	0.	88.	-272.
179	35.	262609.	4.78	325.2	-8.0	.0	2.	55.	-113.
180	28.	262508.	4.77	325.4	-4.1	.0	5.	27.	43.
181	197.	264708.	4.76	325.6	.0	-9.6	8.	-23.	1072.
182	196.	264707.	4.77	326.1	.0	.2	-1.	3.	53.
183	195.	264706.	4.77	325.5	.0	10.4	1.	22.	-768.
184	194.	264705.	4.77	325.2	.0	20.2	-6.	53.	-1860.
185	193.	264704.	4.76	325.0	.0	30.0	-13.	68.	-2518.
186	192.	264703.	4.77	325.3	.0	40.1	-34.	84.	-3047.
187	191.	264702.	4.76	325.4	.0	49.8	-45.	87.	-3101.
188	201.	264712.	4.75	327.1	.0	-48.9	-40.	-90.	3670.
189	200.	264711.	4.75	325.8	.0	-39.0	-24.	-78.	3288.
190	199.	264710.	4.75	325.6	.0	-29.3	-11.	-65.	2635.
191	198.	264709.	4.77	325.6	.0	-19.5	0.	-42.	1929.
192	56.	262908.	4.75	325.3	4.0	.0	4.	-18.	108.
193	86.	263507.	4.77	326.1	8.0	-49.1	-56.	-149.	4096.
194	85.	263506.	4.77	326.0	8.0	-29.6	-36.	-136.	3593.
195	84.	263505.	4.78	325.6	8.0	-10.0	-8.	-78.	1545.
196	7.	262207.	4.76	325.5	8.0	.0	-1.	-47.	329.
197	83.	263504.	4.77	326.2	8.0	10.0	3.	-22.	-682.
198	82.	263503.	4.77	326.8	8.0	30.2	-21.	21.	-2582.
199	81.	263502.	4.76	325.8	8.0	50.0	-61.	44.	-3456.
200	14.	262309.	4.77	325.3	12.0	.0	-11.	-81.	451.

DVK Projekt Windhinder

Rapport No. 04680-6-NS

*** OPDRACHT NO. M04680D ***
 *** RIJN-HERNE : BALLAST, BREED WATER ***
 *** WATERDIEPTE 3.65 METER ***

NR	VNR	TESTNO	VSGEM	TOEREN	BETGEM	DELTA1	FXC	FY	MZ
	VNR	-	M/S	RPM	DEG	DEG	KN	KN	KNM
201	122.	264106.	4.77	325.5	15.9	-48.9	-73.	-255.	5324.
202	121.	264105.	4.77	325.1	15.9	-27.2	-49.	-249.	5036.
203	120.	264104.	4.75	325.2	15.9	-9.7	-21.	-179.	2584.
204	21.	262408.	4.73	325.4	16.0	.0	-11.	-132.	971.
205	119.	264103.	4.77	325.3	15.9	10.0	-16.	-108.	-294.
206	118.	264102.	4.78	325.2	15.9	30.0	-30.	-49.	-2306.
207	117.	264101.	4.77	324.5	15.9	49.9	-64.	-33.	-2743.

DVK Project Windhinder

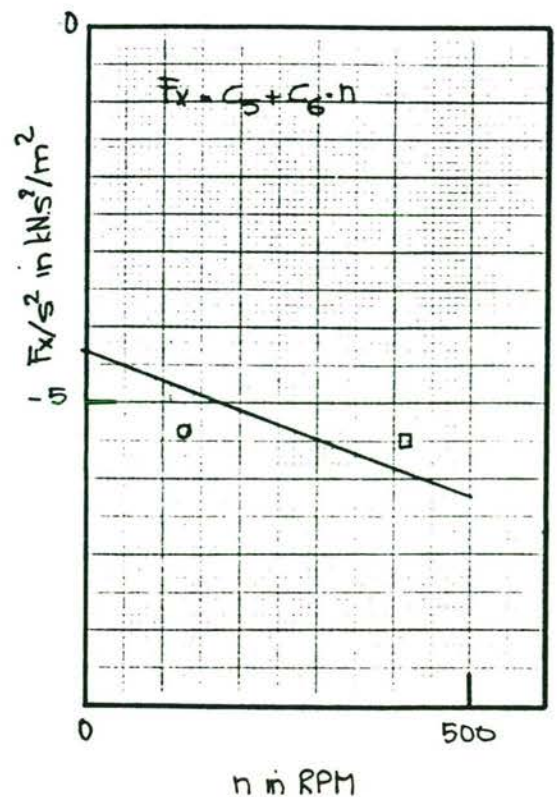
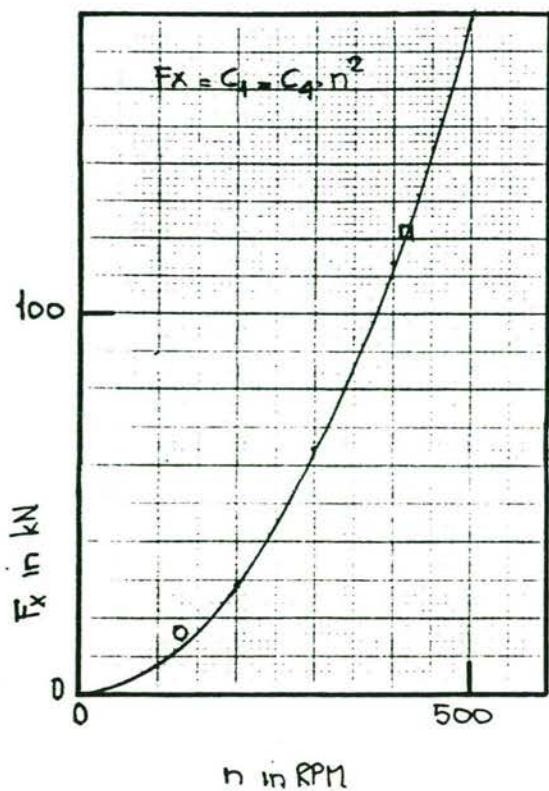
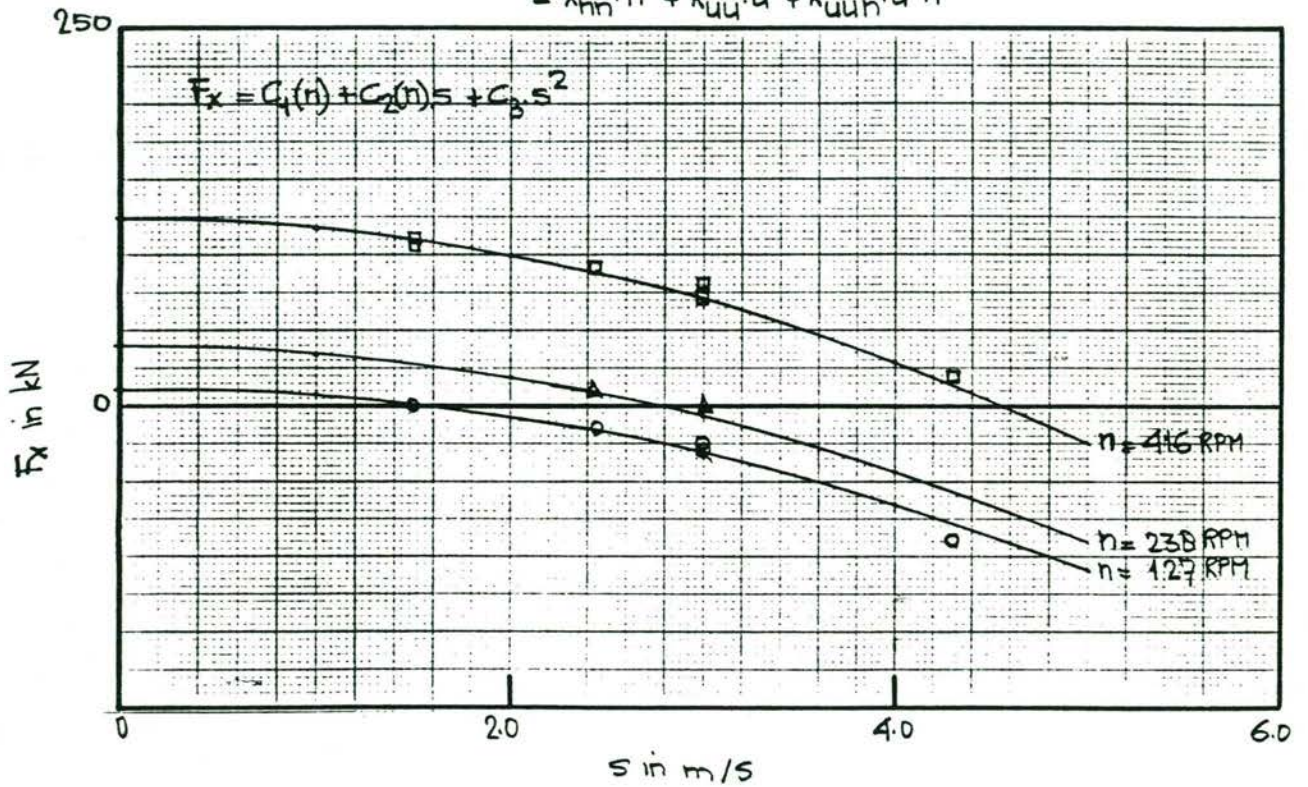
DVK Projekt Windhinder

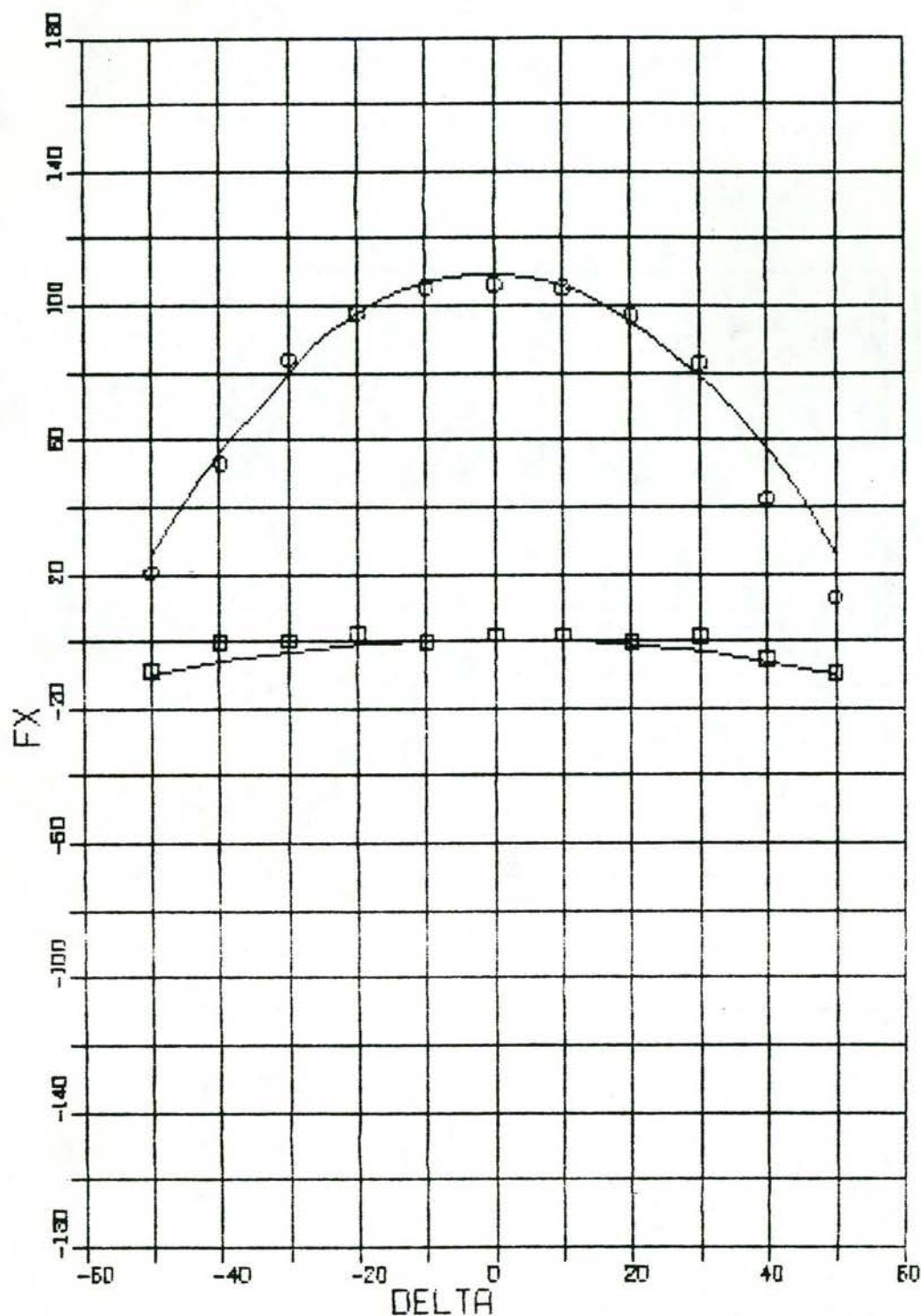
COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-heme kanaal schip beladen, breed water

$$F_x (\beta=0, \delta=0) = X_{nn} \cdot n^2 + X_{ss} \cdot s^2 + X_{sn} \cdot s^2 n$$

$$\hat{=} X_{nn} \cdot n^2 + X_{uu} \cdot u^2 + X_{un} \cdot u^2 n$$





DVK Projekt Windhinder

REV

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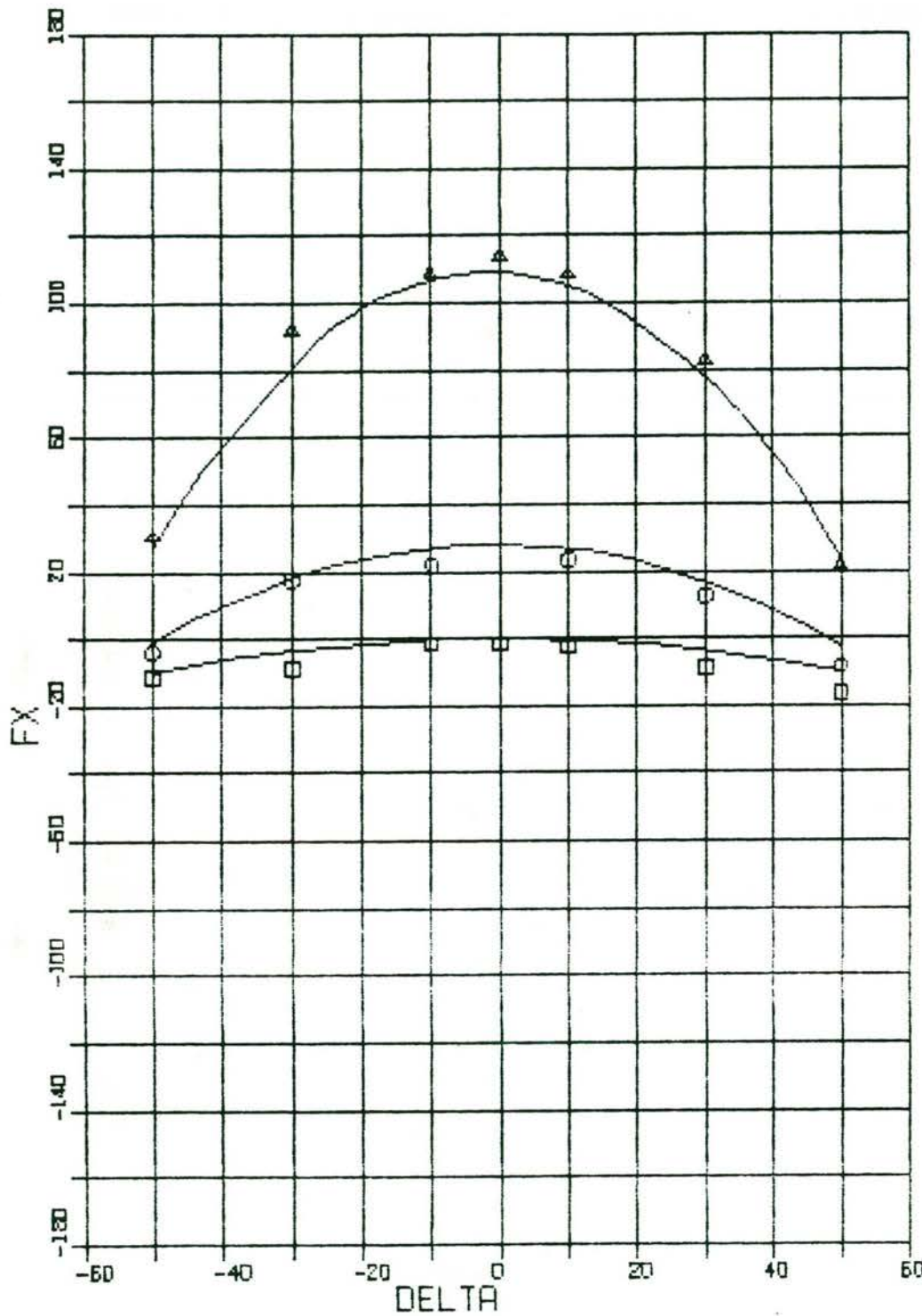
CONS S 1.5000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NW, UU, UUN, DOUU, DONN, DONN UU, DVNN, VVUU, VVVV)



DVK Projekt Windhinder

REV

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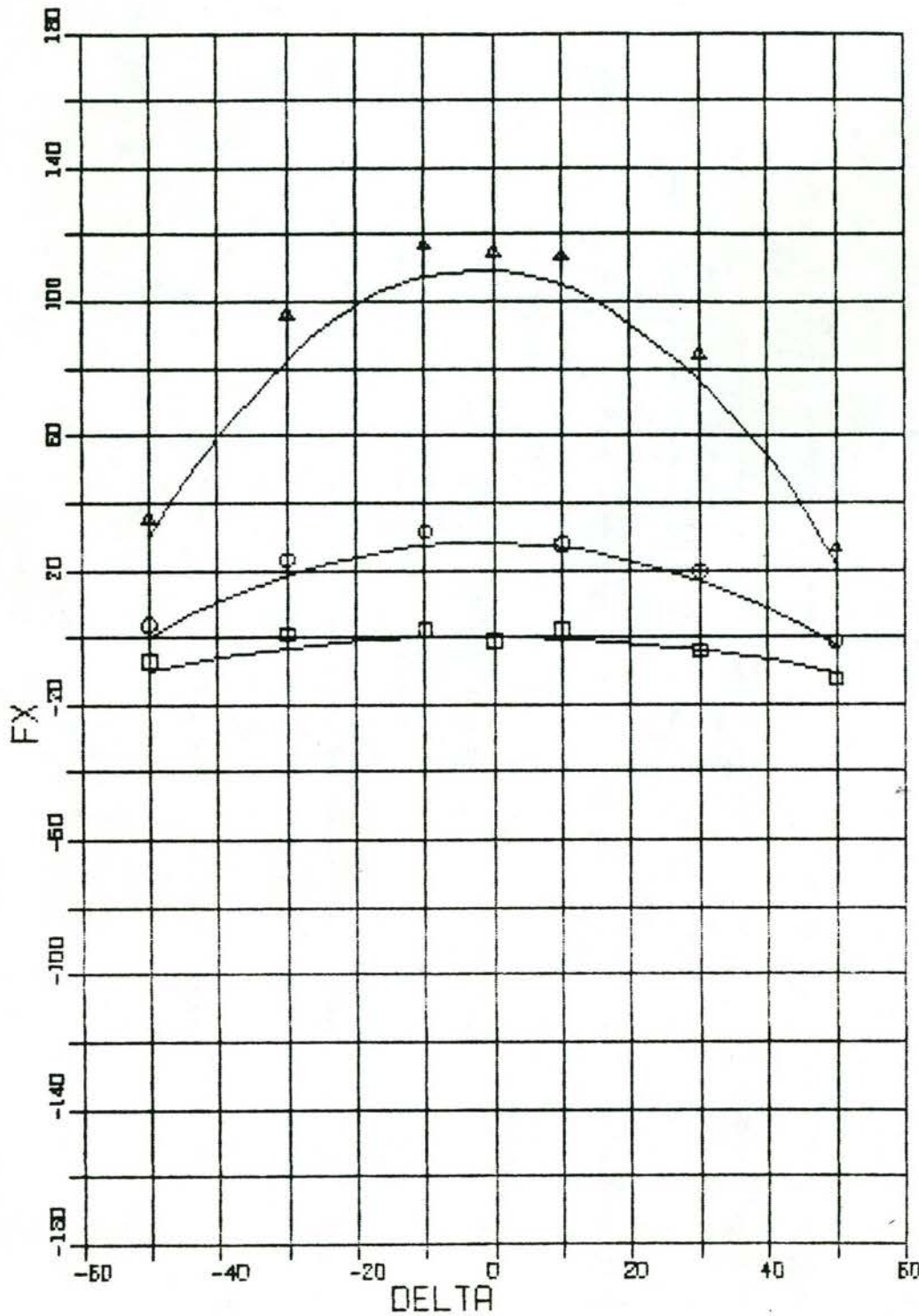
CONS S 1.5000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NN, UU, UUN, DEUU, DUNN, DUNNUU, DVNN, VUUU, VVVV)



DVK Projekt Windhinder

REV

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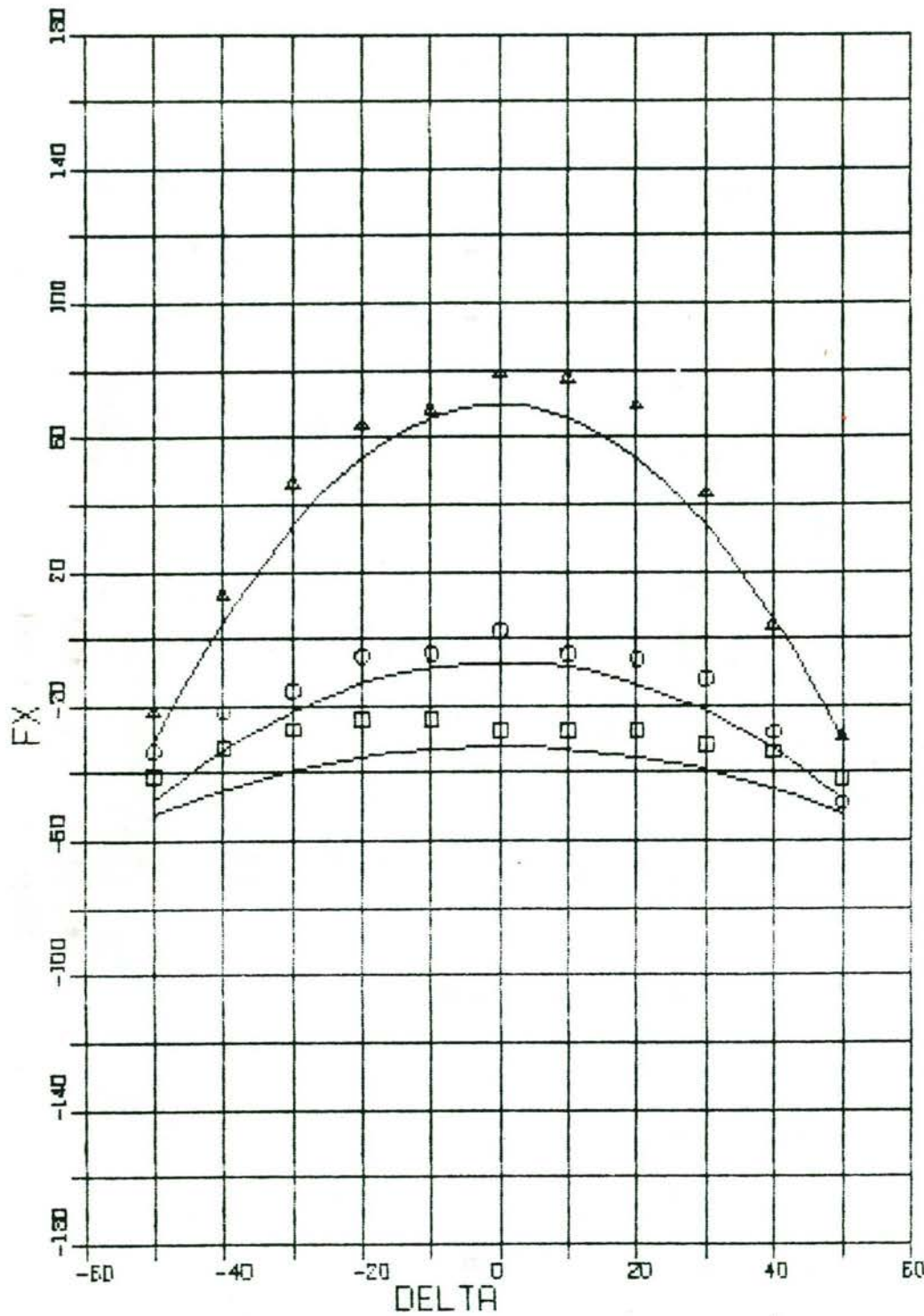
CONS S 1.5000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NN, UU, UUN, DOUU, DOUN, DONN, DVNN, VVUU, VVV)



DVK Projekt Windhinder

REV

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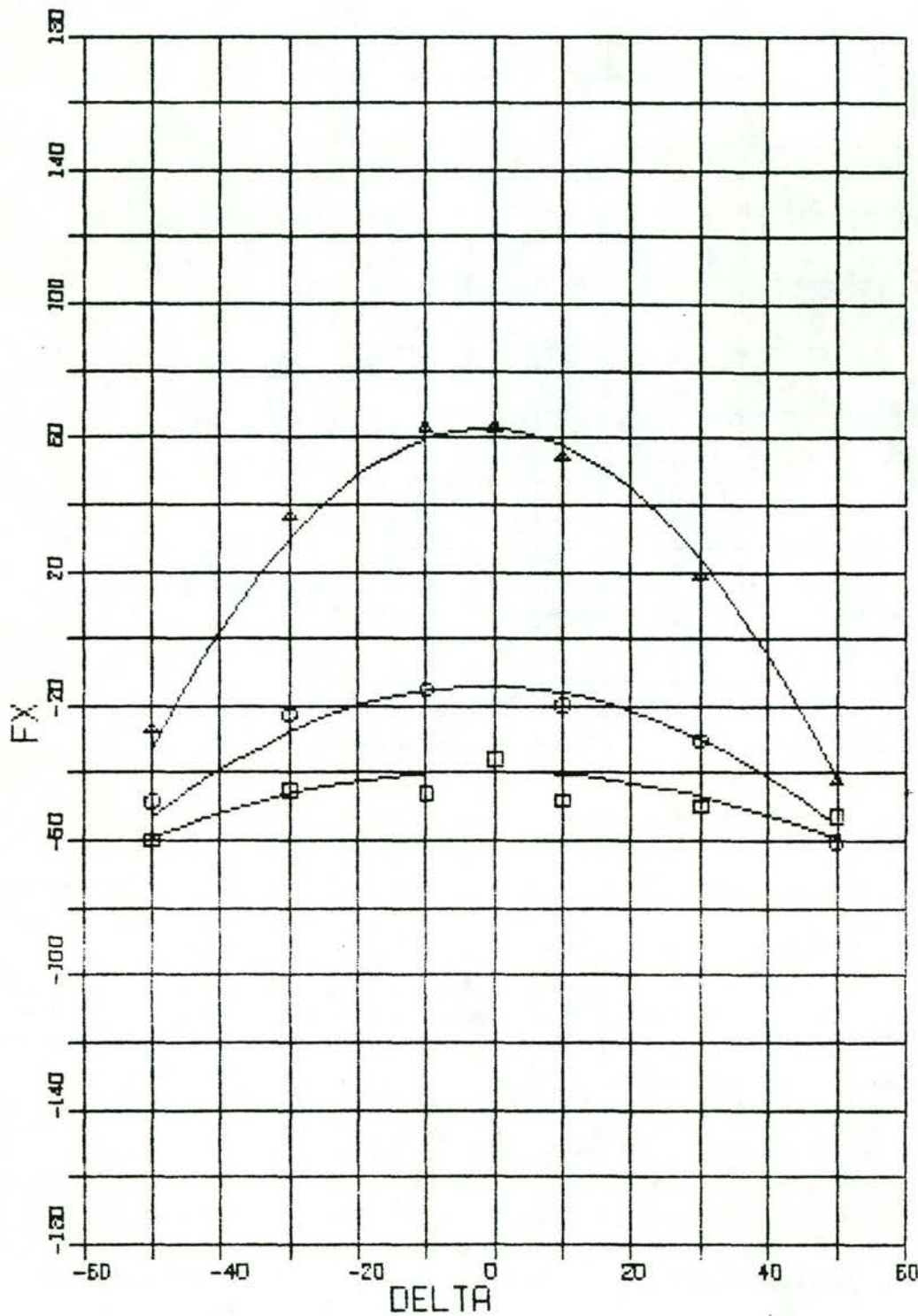
CONS S 3.0000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (N1, U1, UUN, DDUU, DDUUN, DDUUNU, DUNU, VVUU, VVVV)



DVK Projekt Windhinder

REV

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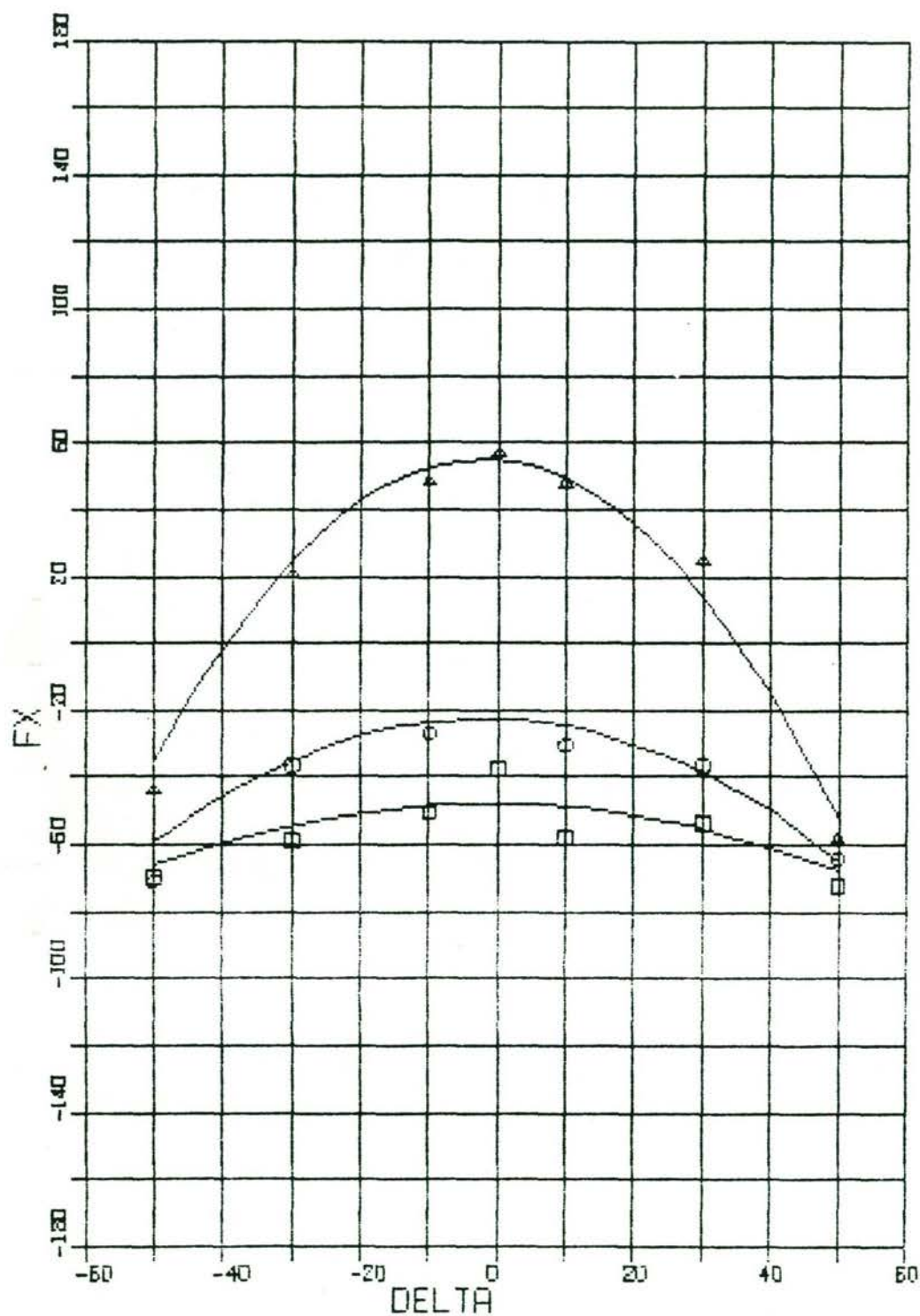
CONS S 3.0000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NN, UU, UUN, DOUU, DONN, DONNUU, DVNN, VVUU, VVVV)



DVK Projekt Windhinder

REV

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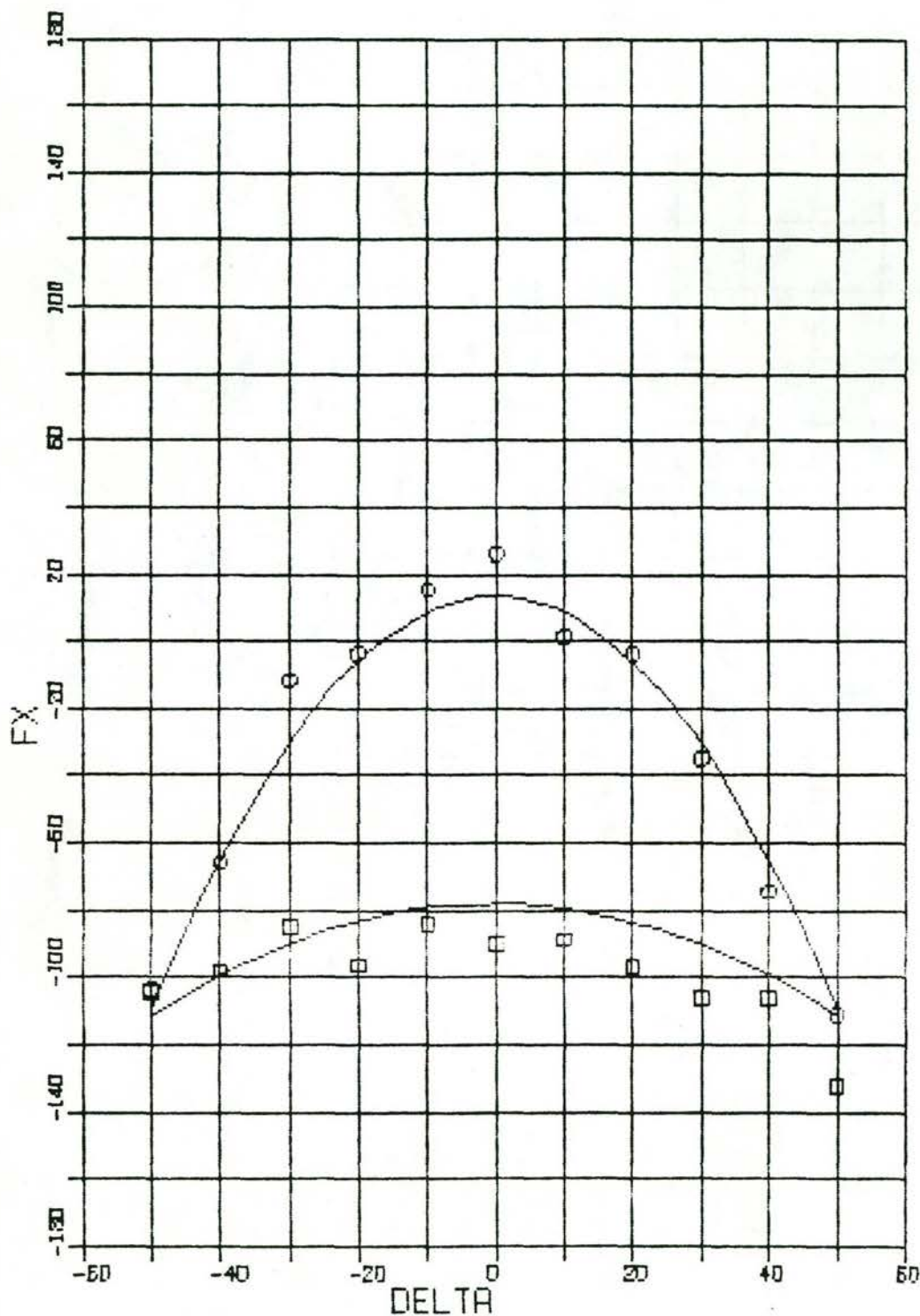
CONS S 3.0000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NN, UU, UUN, DDUU, DDNN, DDNNUU, DVNN, VVUU, VVVV)



DVK Projekt Windhinder

REV

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CONS S 4.3000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

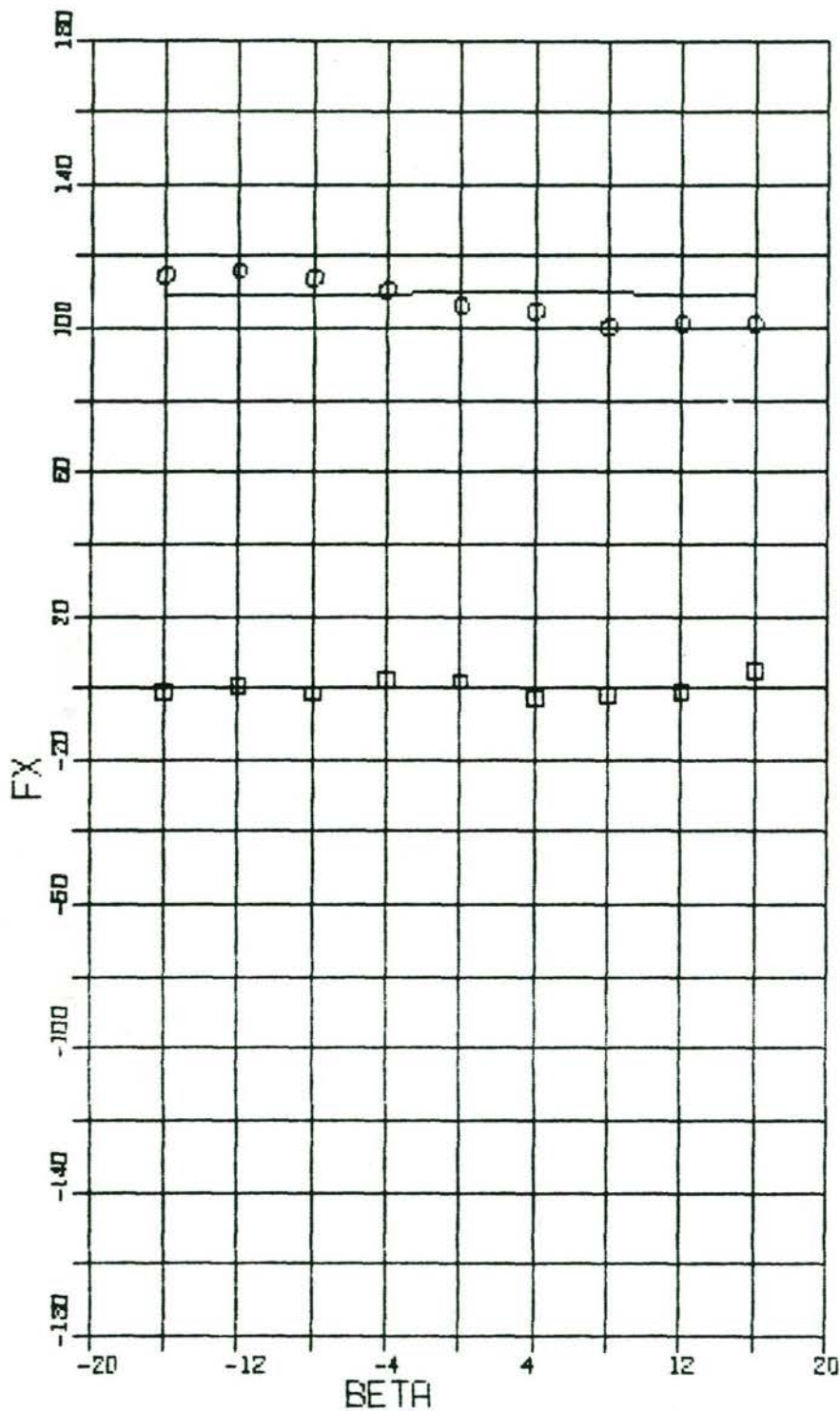
FX = (NN, UU, DUN, DOOU, DONN, DONNDD, DVVN, VVUU, VVVV)

DVK Projekt Windhinder

REV

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CONS S 1.5000

CONS DELTA .0000

RIJN-HERNE (BELADEN,BREED WATER)

STATISCHE PROEVEN

FX = (NN,UU,UUN, DDUU,DDNN,DDNNUU, DVNN, VVUU,VVV)

DVK Projekt Windhinder

REV

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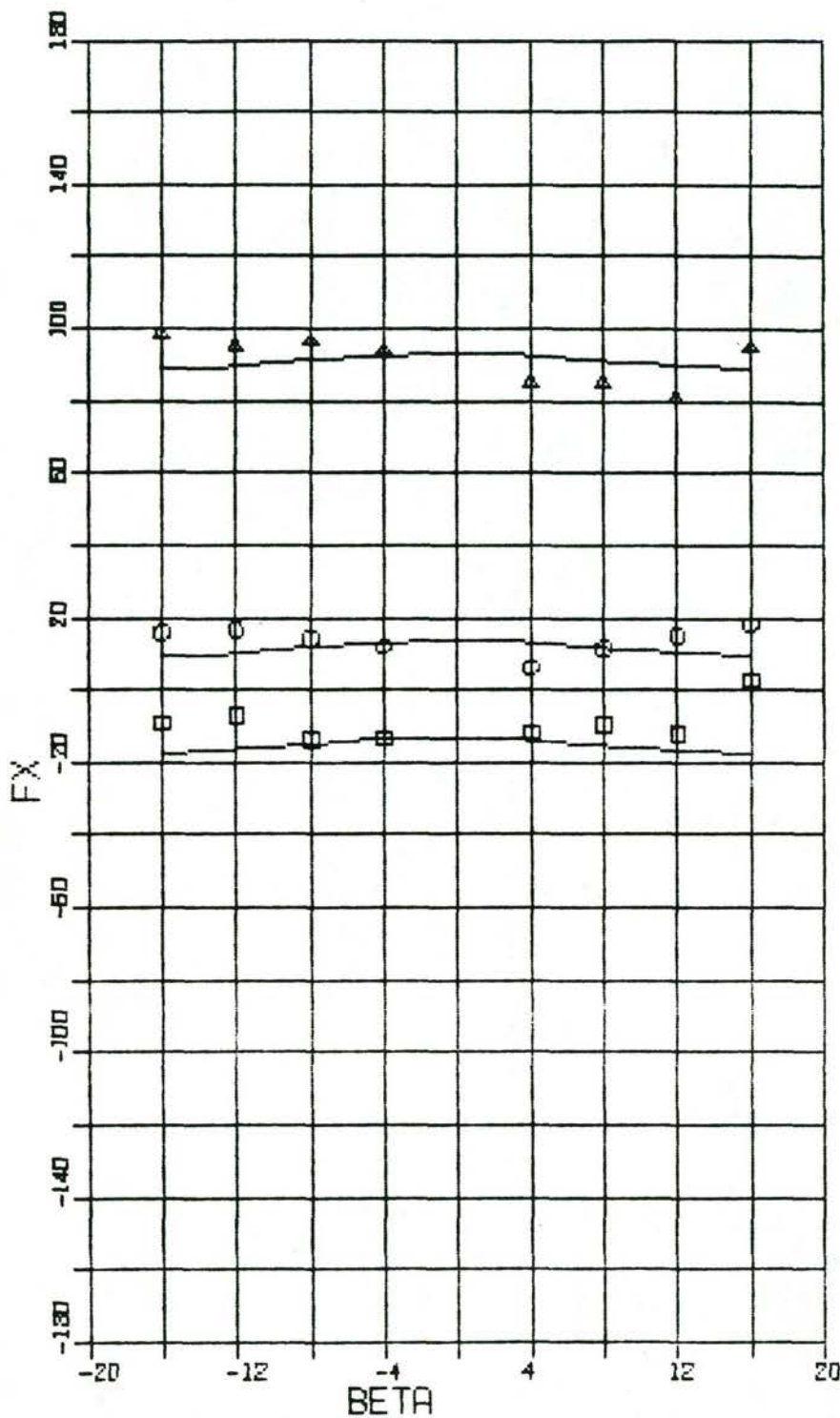
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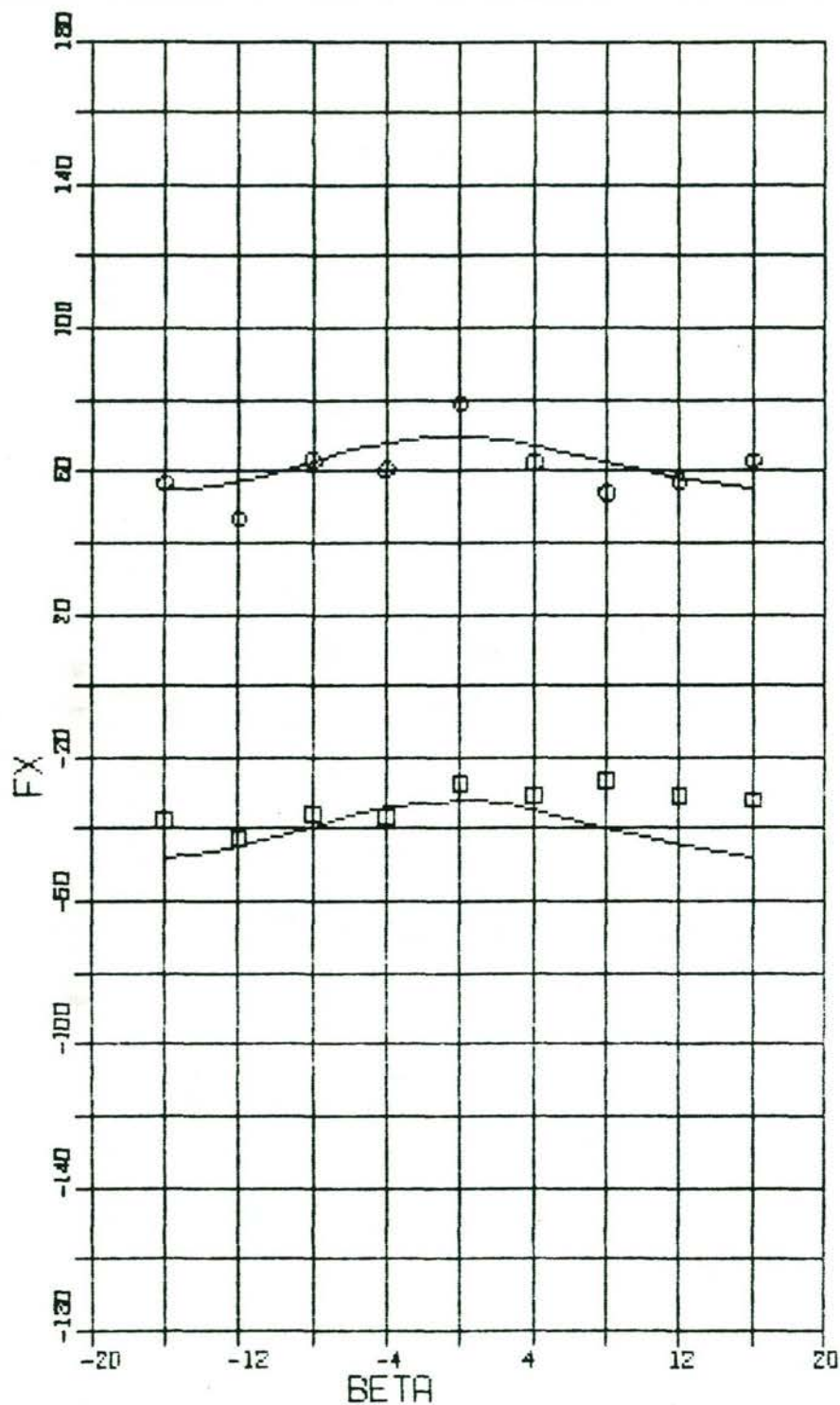
CONS S 2.2500

CONS DELTA .0000

RIJN-HERNE (BELADEN,BREED WATER)

STATISCHE PROEVEN

FX = (NN,UU,UUN, DOUU,DDNN,DDNNUU, DVNN, VVUU,VVV



DVK Projekt Windhinder

REY

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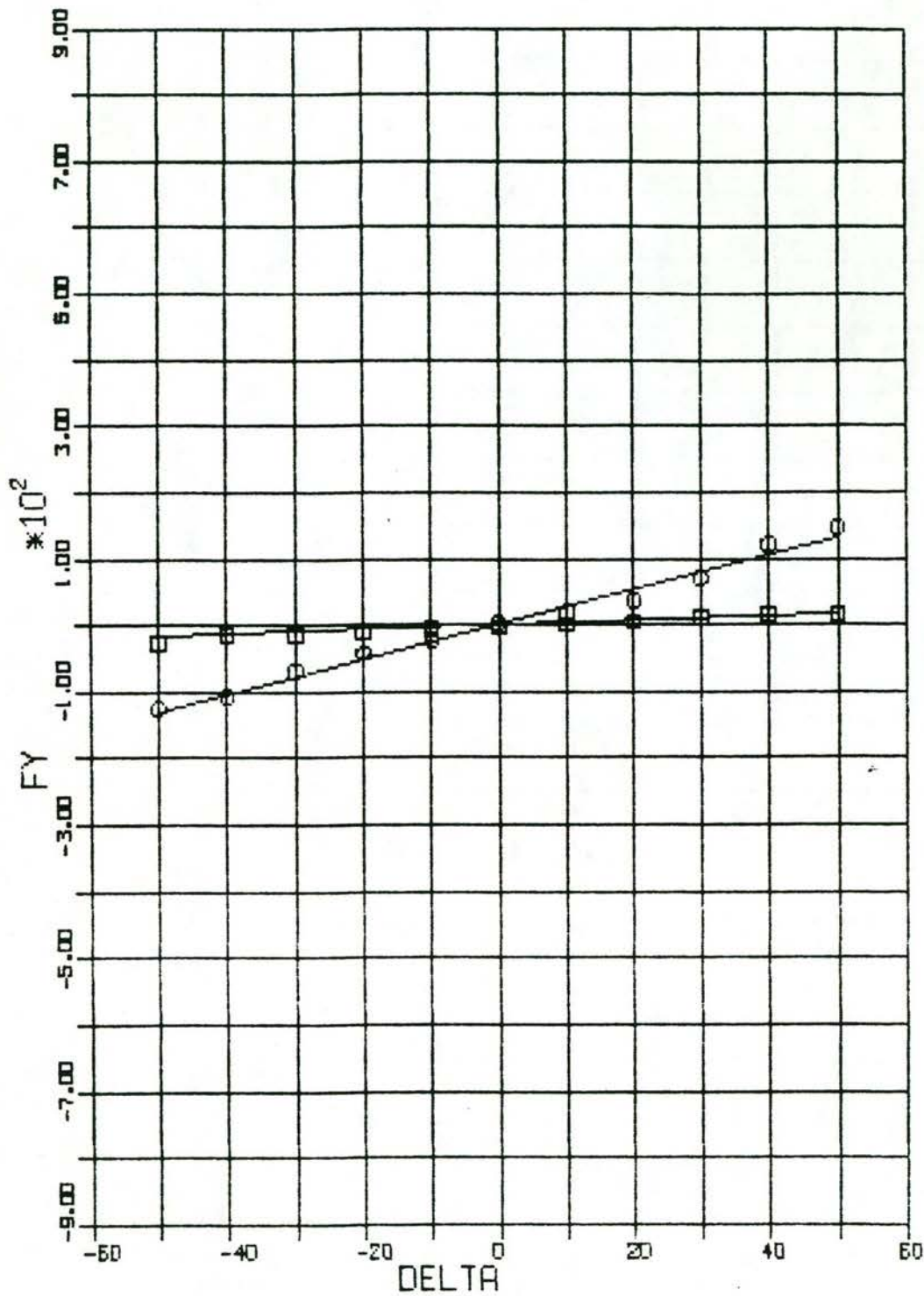
CONS S 3.0000

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FX = (NW, UU, UUN, DOUU, DONN, DONNUU, DVNN, VVUU, VVUN)



DVK Projekt Windhinder

REV

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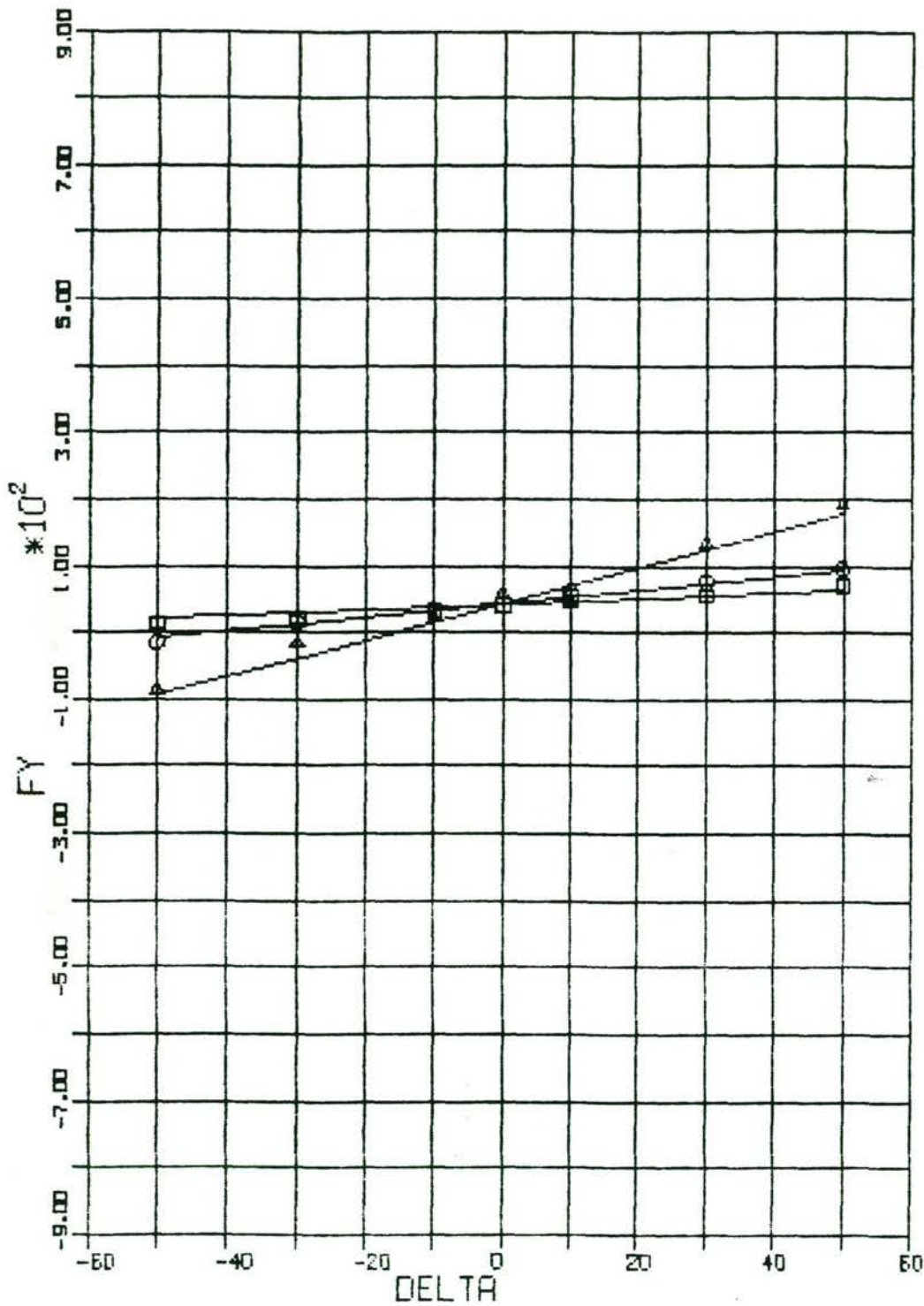
CONS S 1.5000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

REY

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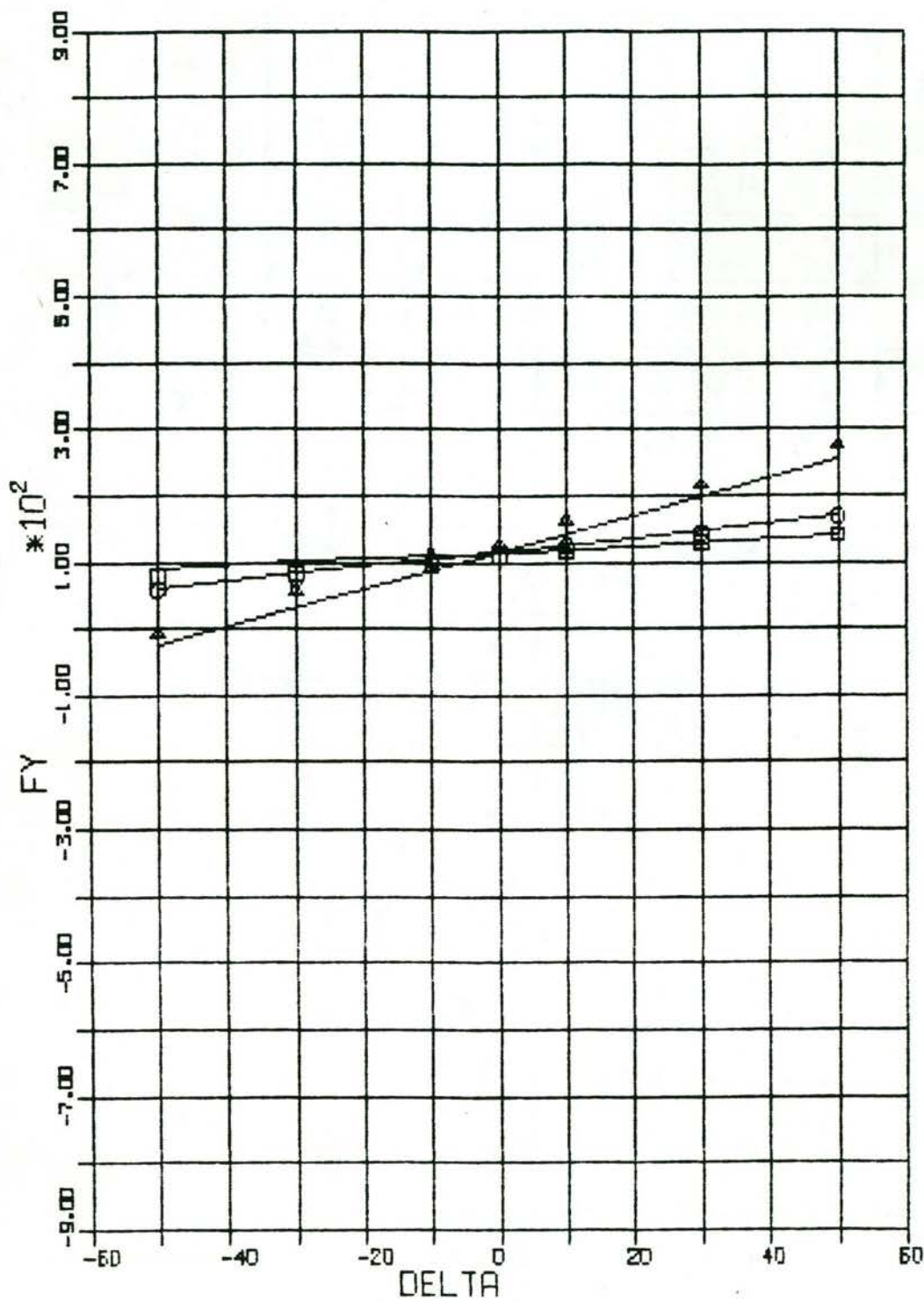
CONS S 1.5000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNUU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

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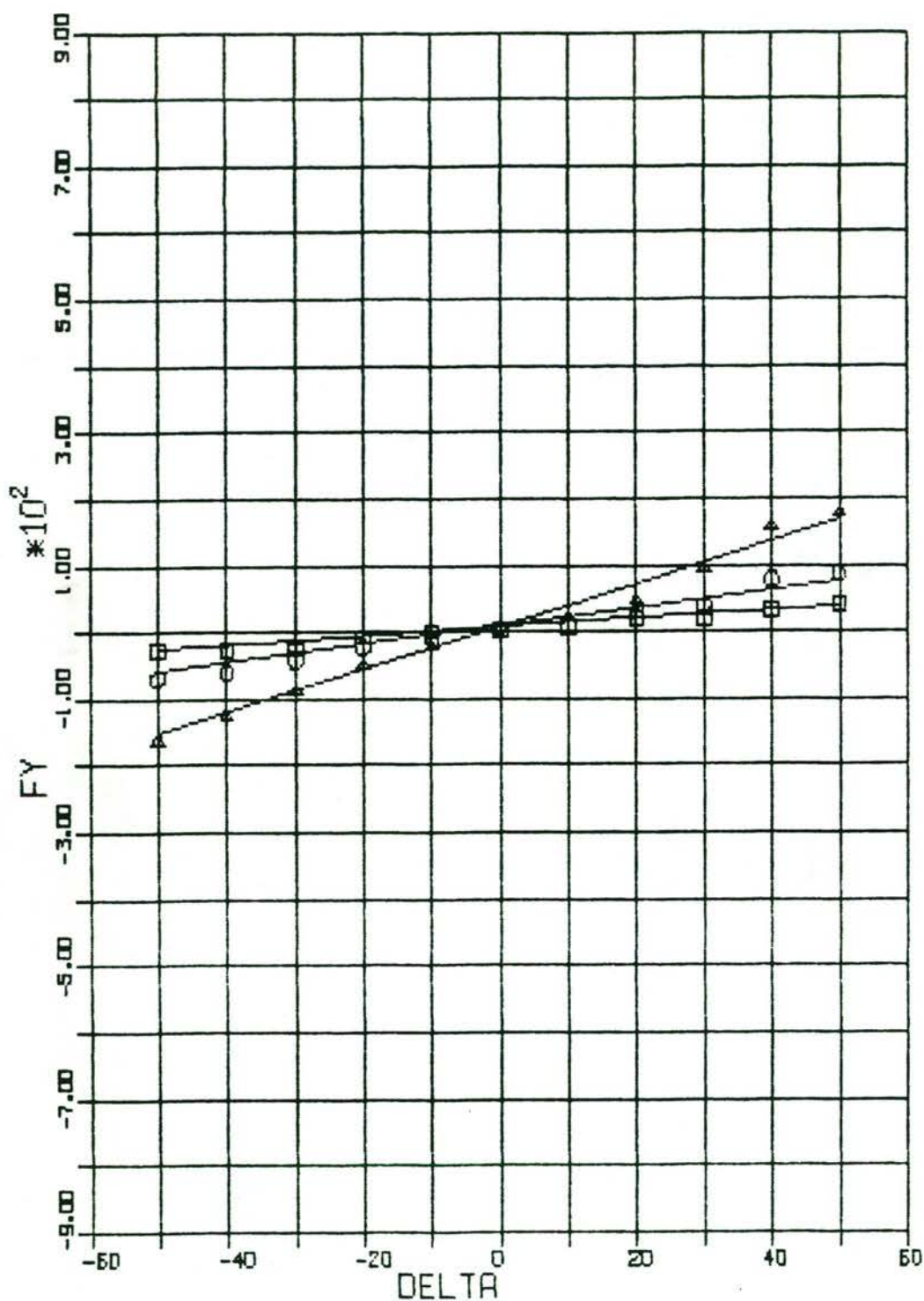
CONS S 1.5000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (DU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

REV

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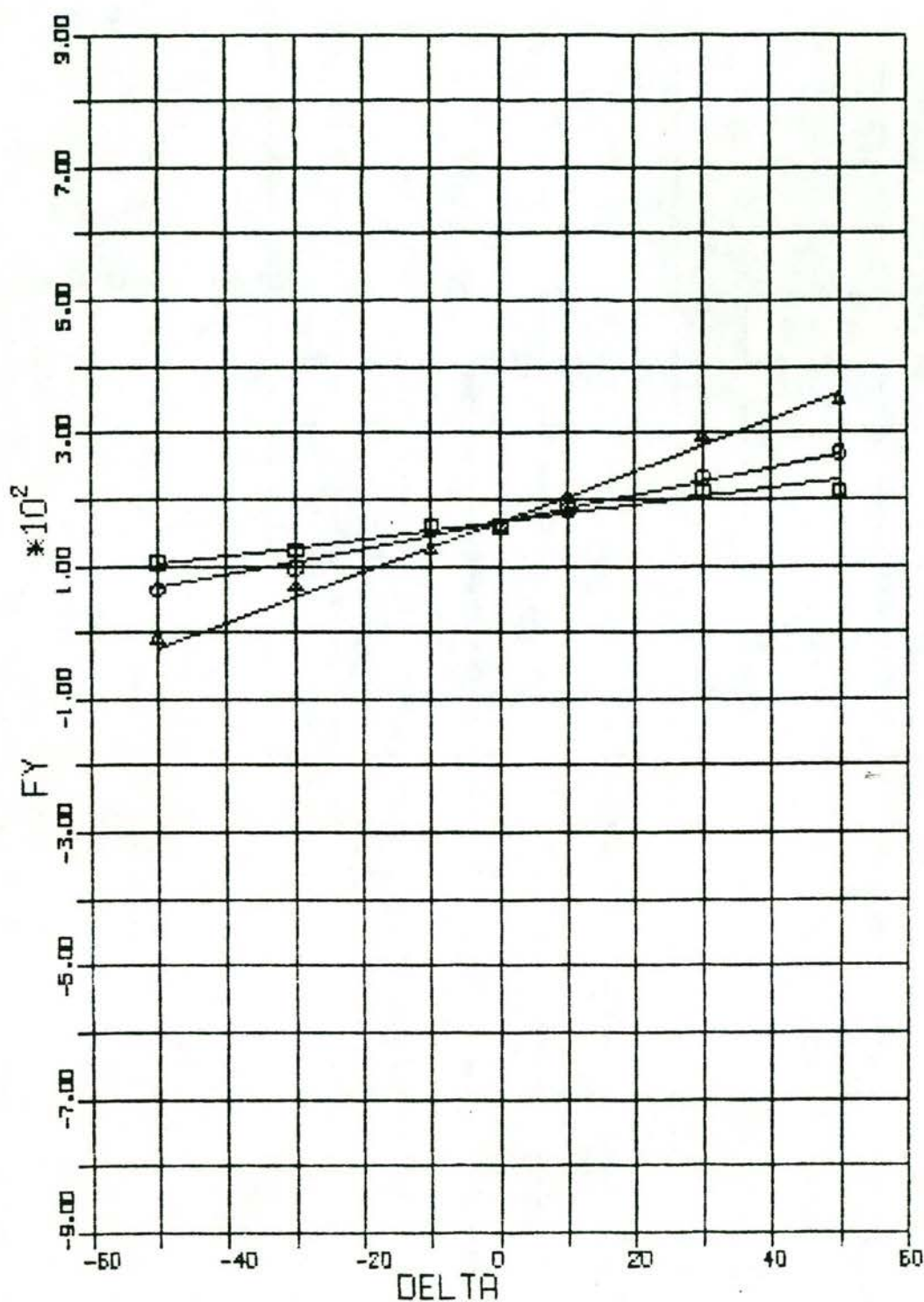
CONS S 3.0000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



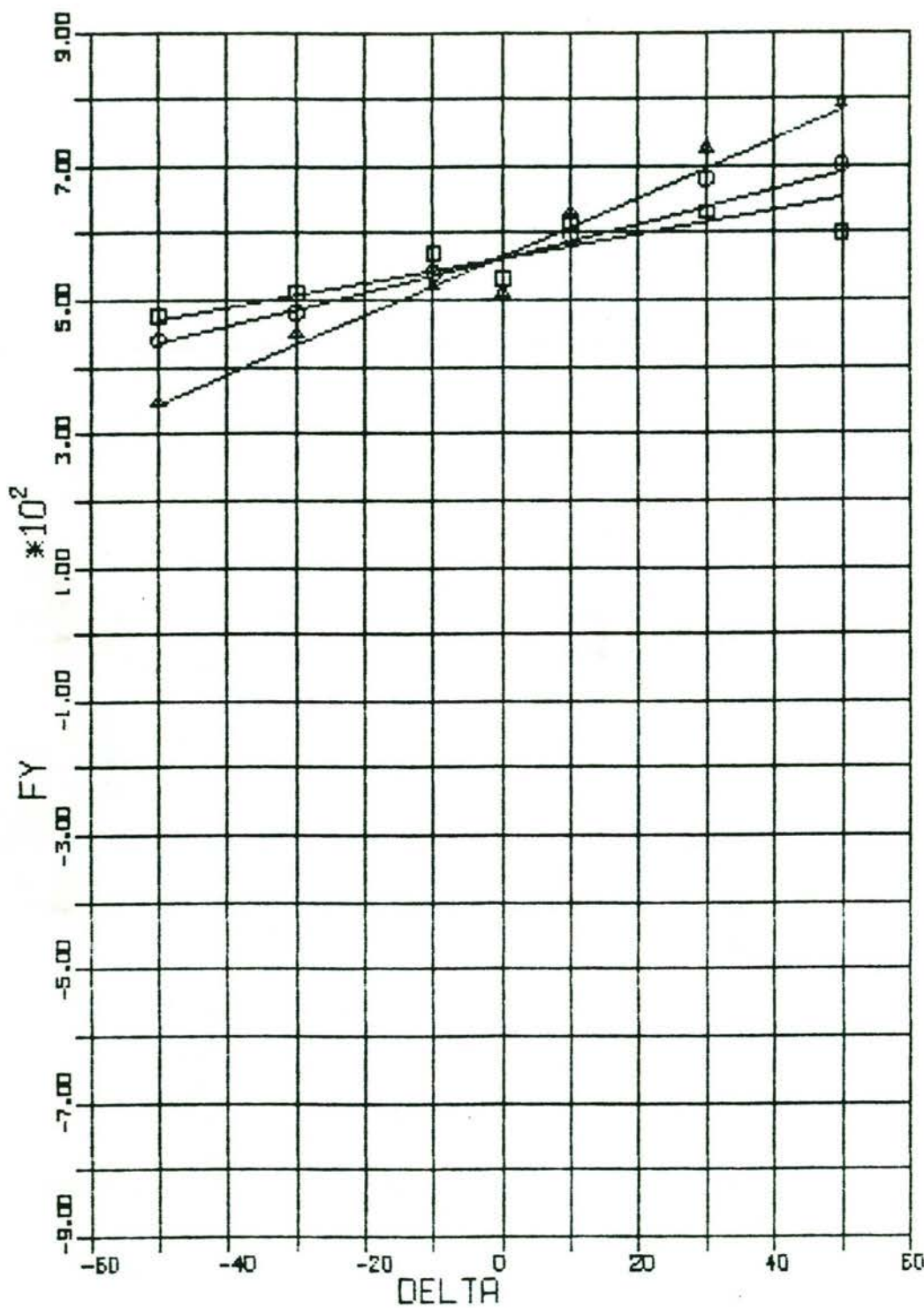
CONS S 3.0000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (LU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



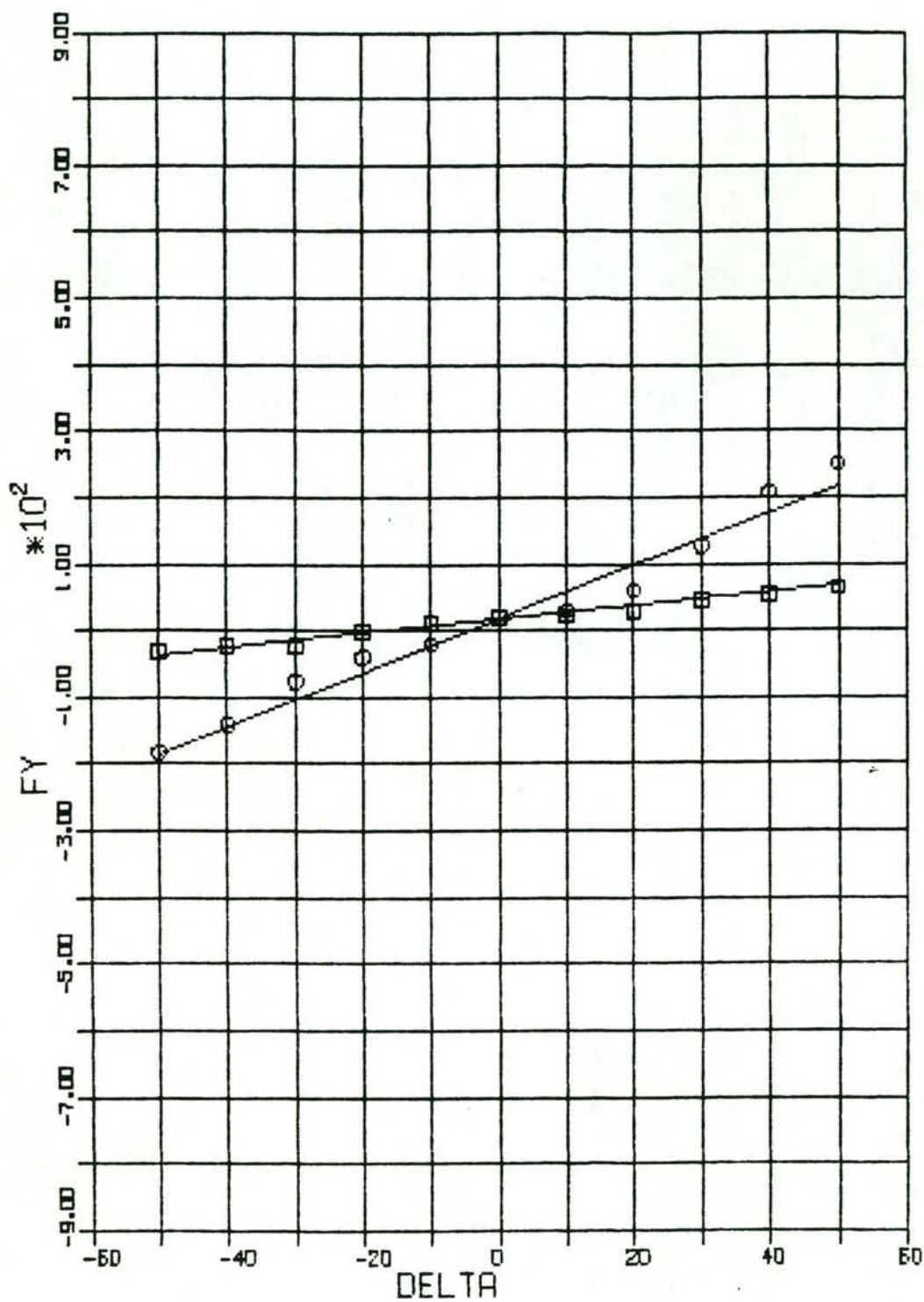
CONS S 3.0000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNNU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

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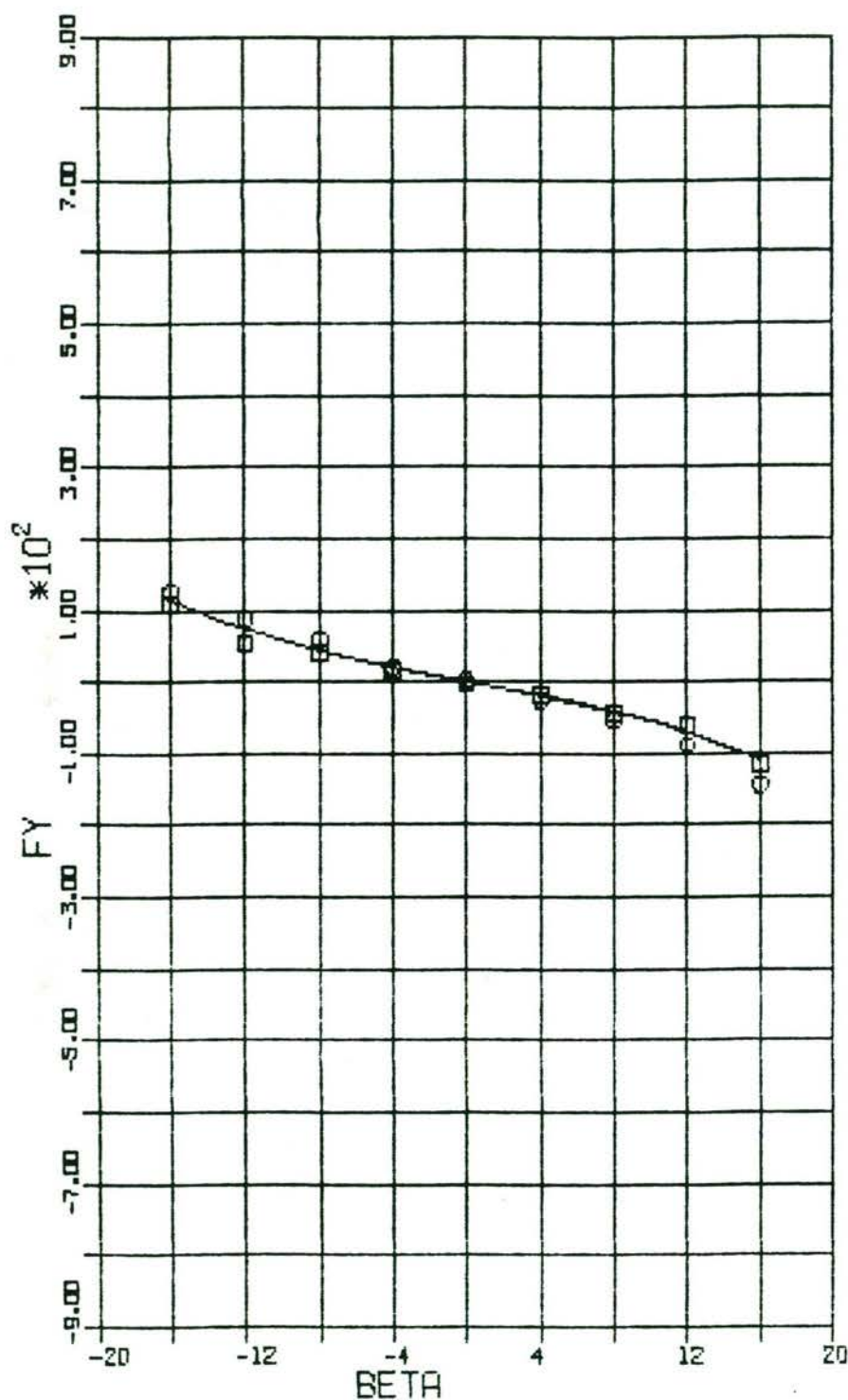
CONS S 4.3000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

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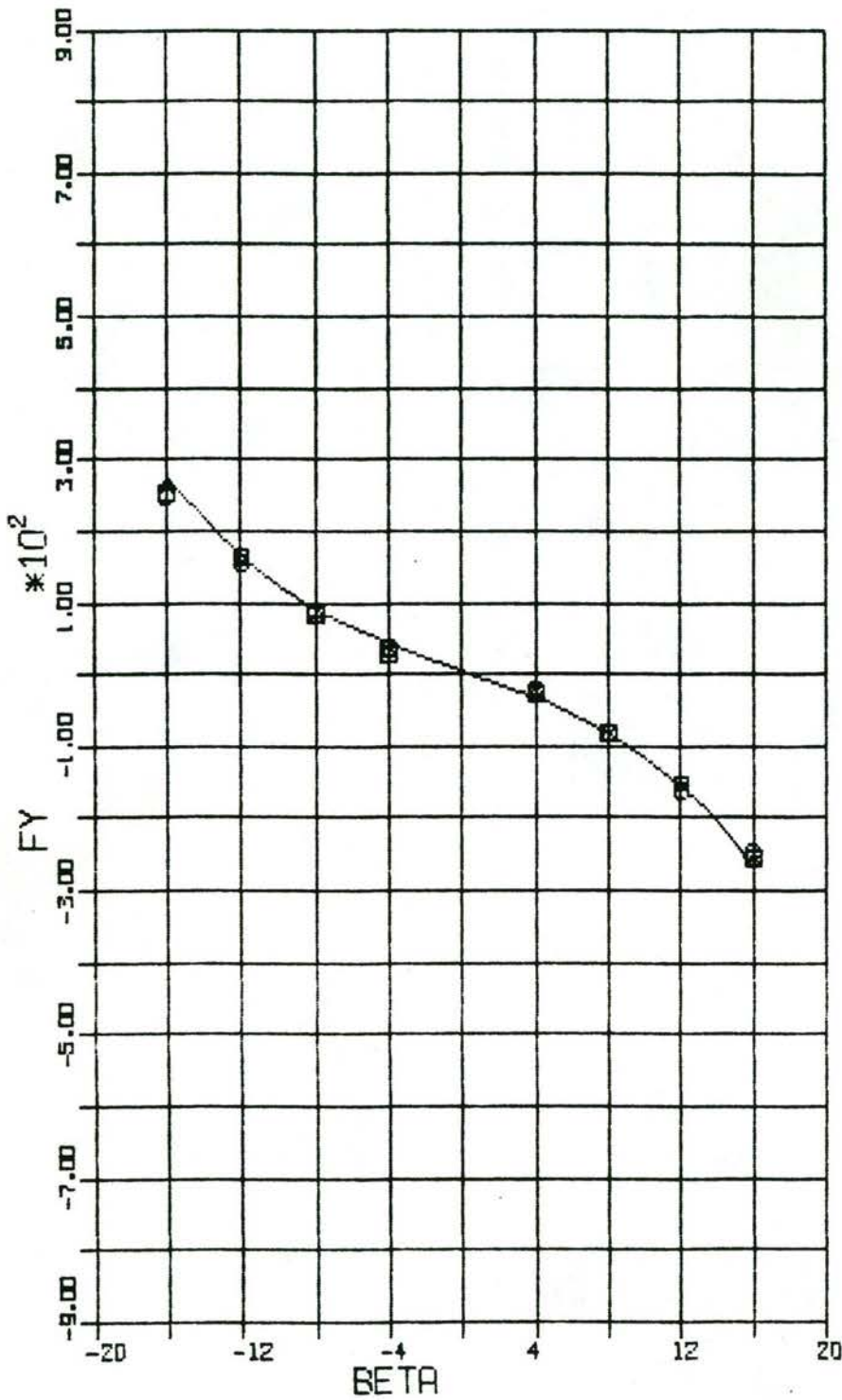
CONS S 1.5000

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNLU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

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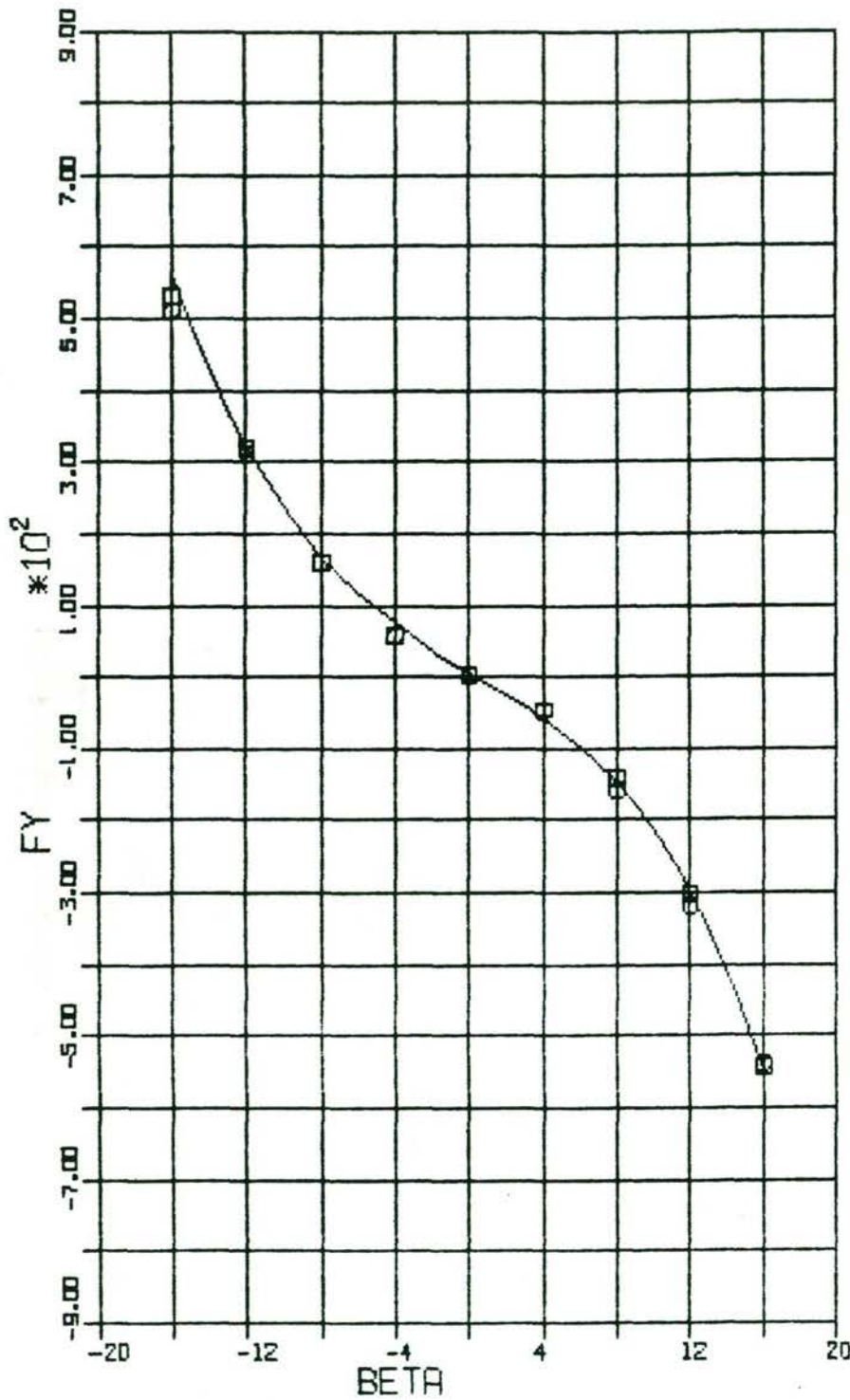
CONS S 2.2500

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DN UU, DVUU, V, VUU, VVV)



DVK Projekt Windhinder

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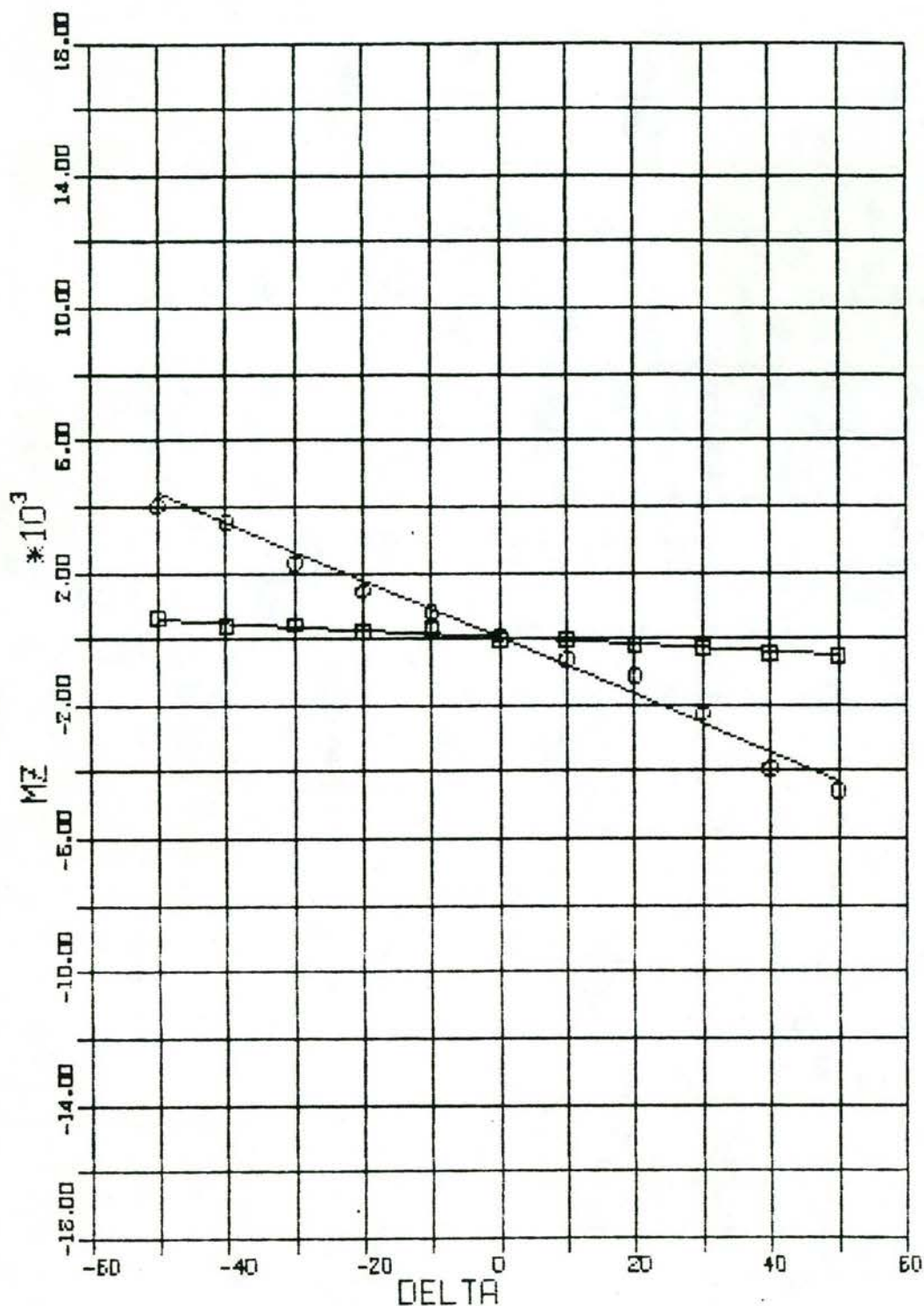
CONS 6 3.0000

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

FY = (UU, DUU, DNN, DNLU, DVUU, V, YUU, VVV)



DVK Projekt Windhinder

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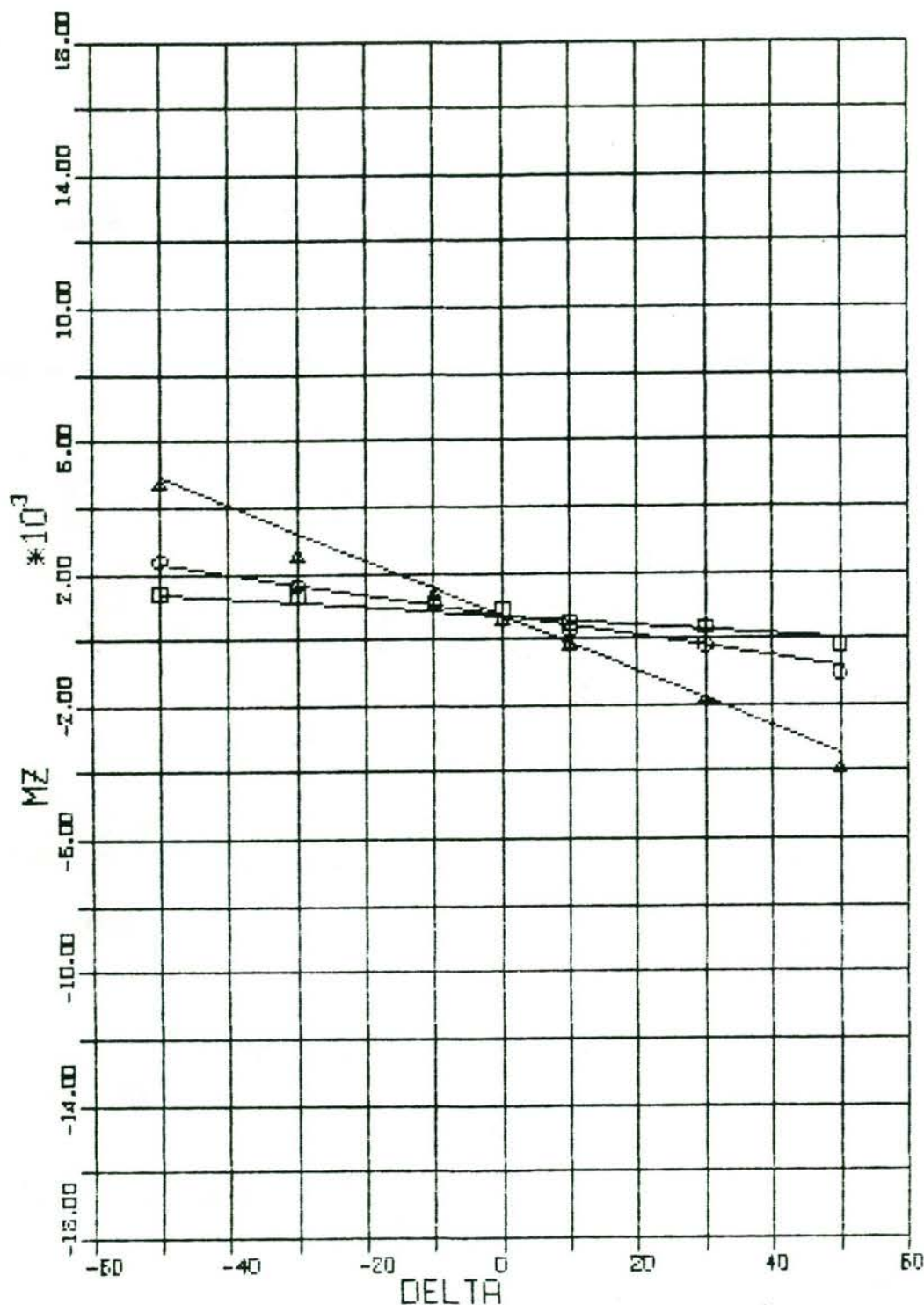
CONS S 1.5000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DVU, DYN, VU, VVUU)



DVK Projekt Windhinder

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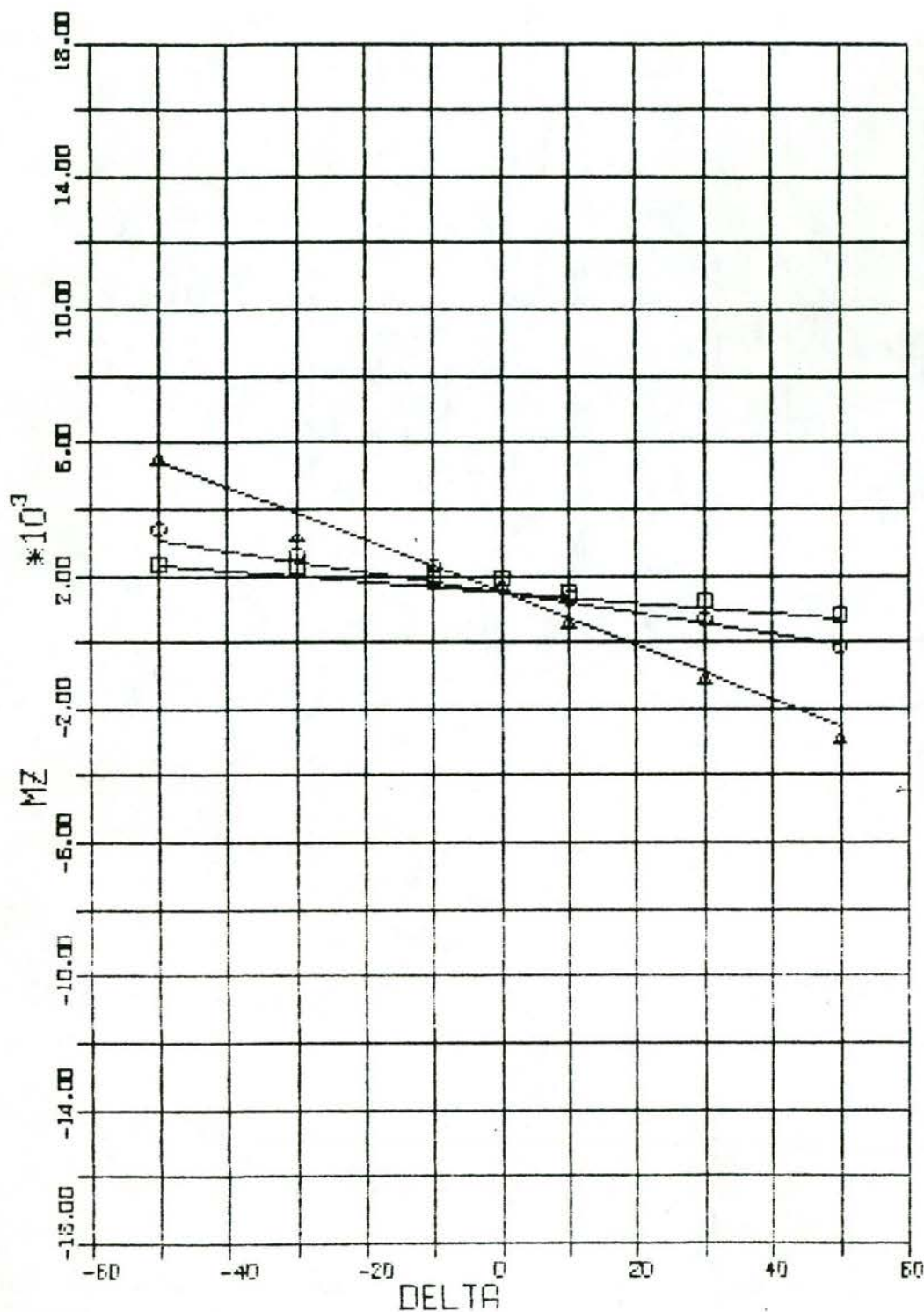
CONS S 1.5000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DVU, DVN, VU, VVUU)



DVK Projekt Windhinder.

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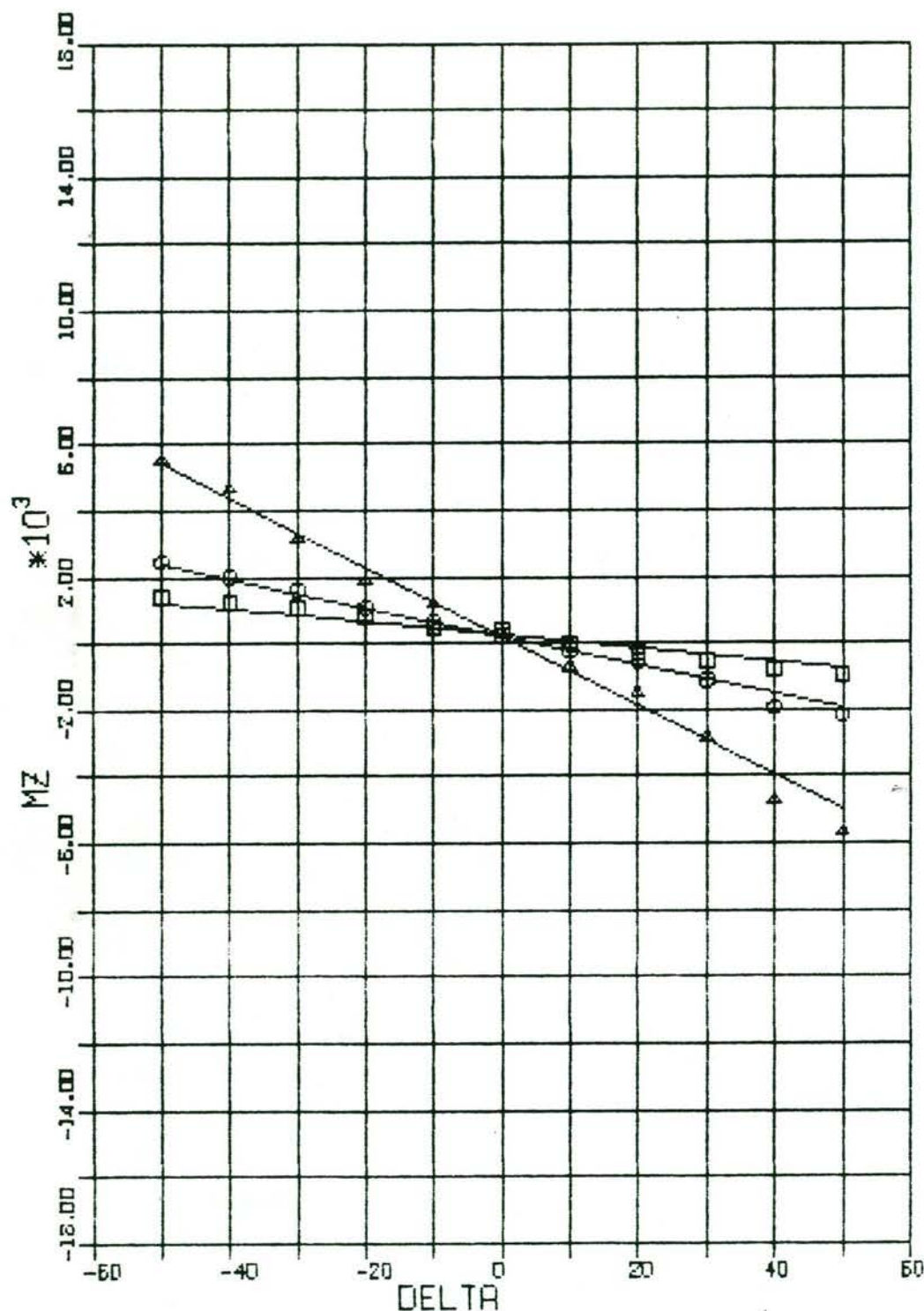
CONS 8 1.5000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, ONUU, DVU, DVN, VU, VVVUU)



DVK Projekt Windhinder

REV

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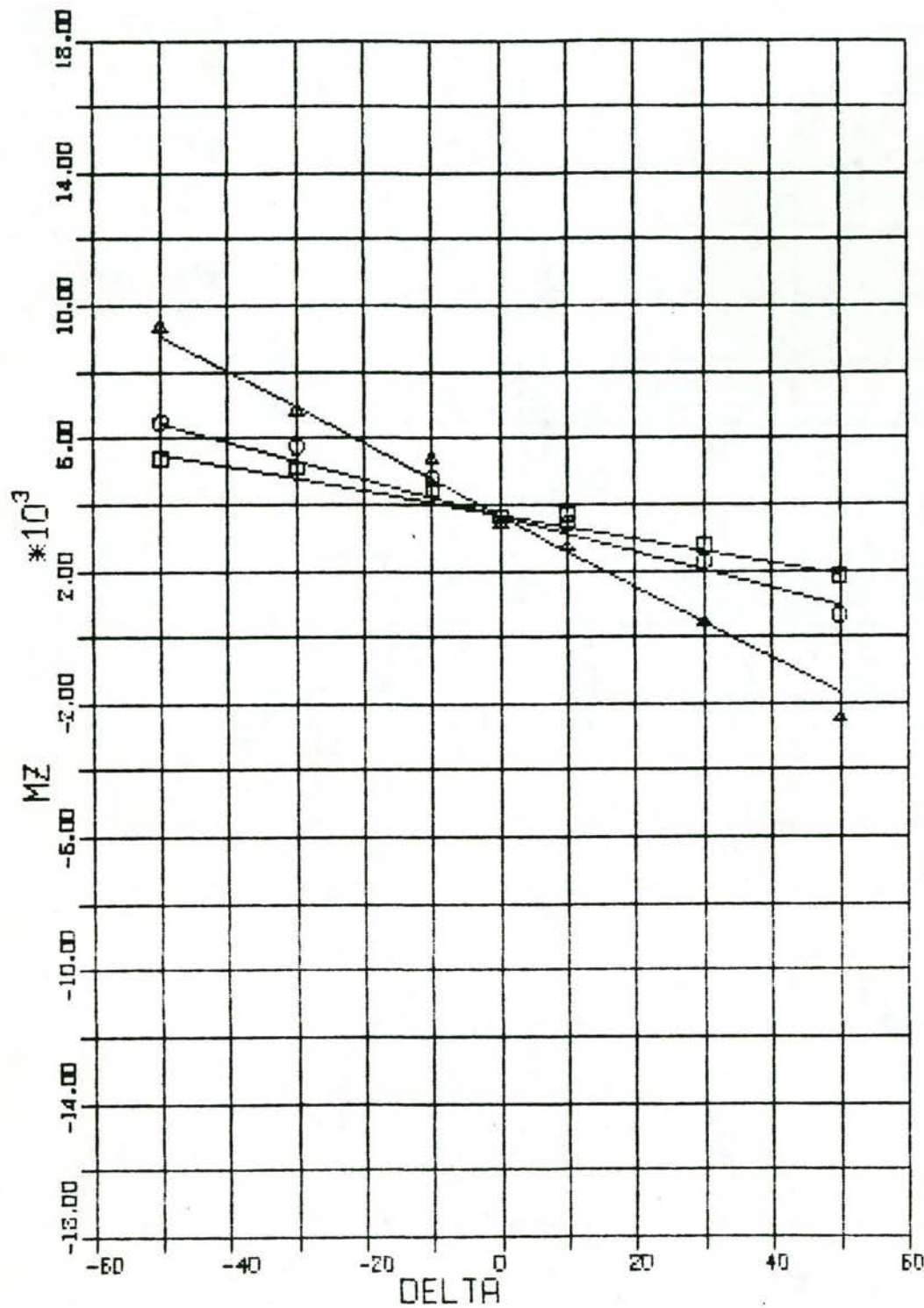
CONS S 3.0000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DVU, DVN, VU, VVVUU)



DVK Projekt Windhinder

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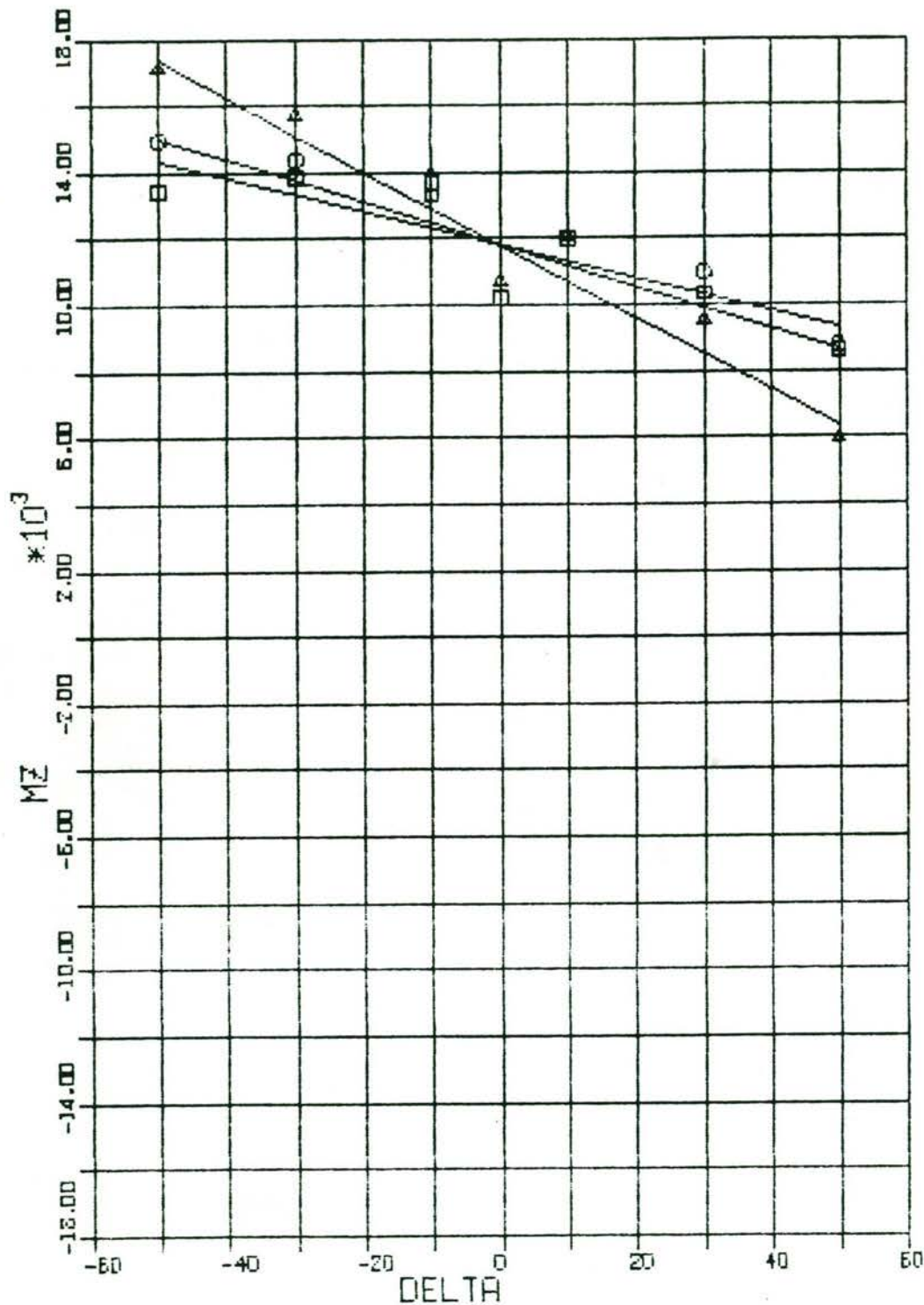
CONS S 3.0000

CONS BETA -8.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNLU, DVU, DVN, VU, VVVUU)



DVK Projekt: Windhinder

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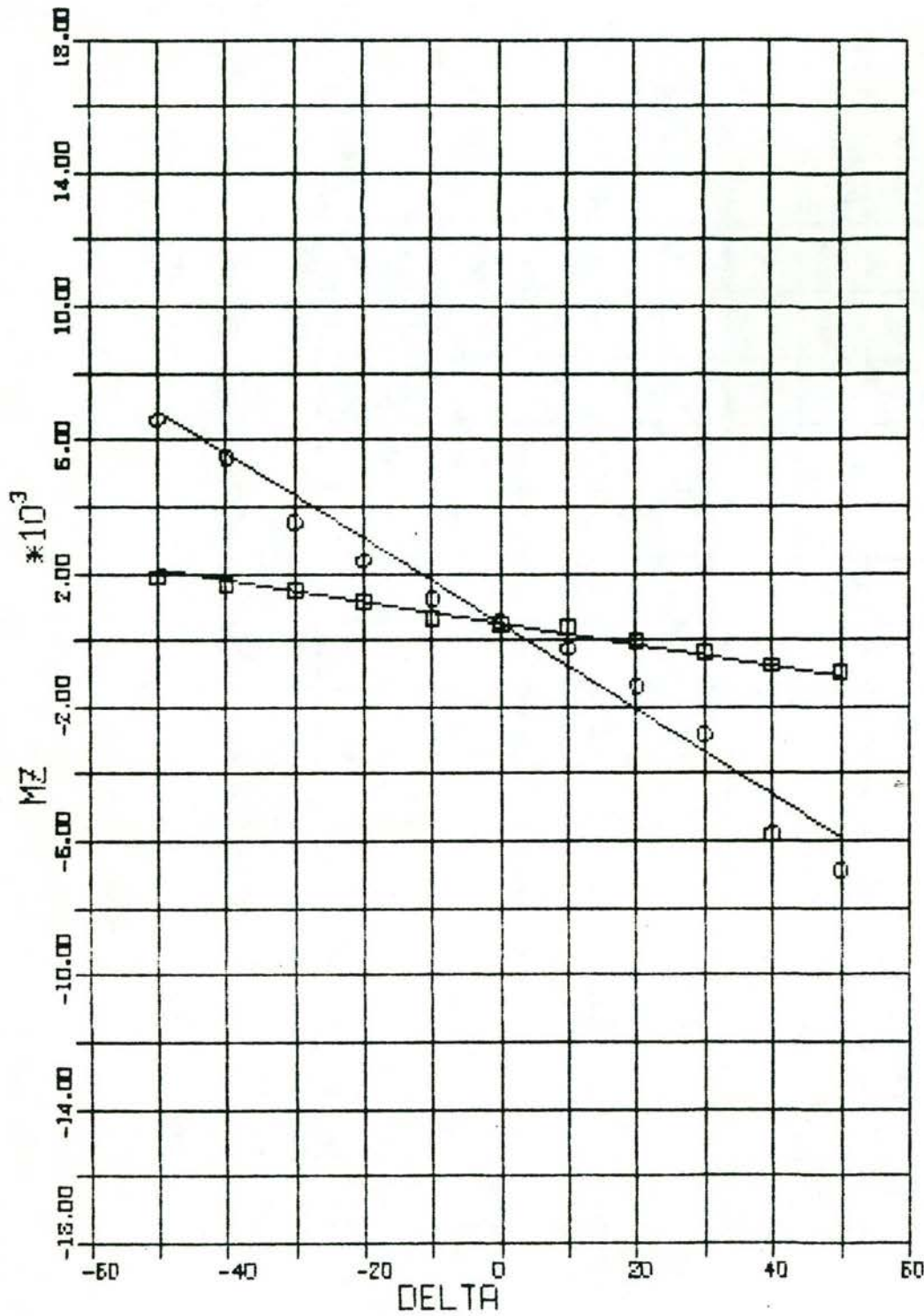
CONS S 3.0000

CONS BETA -16.0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DVU, DVN, VU, VVUU)



DVK Projekt Windhinder

REV

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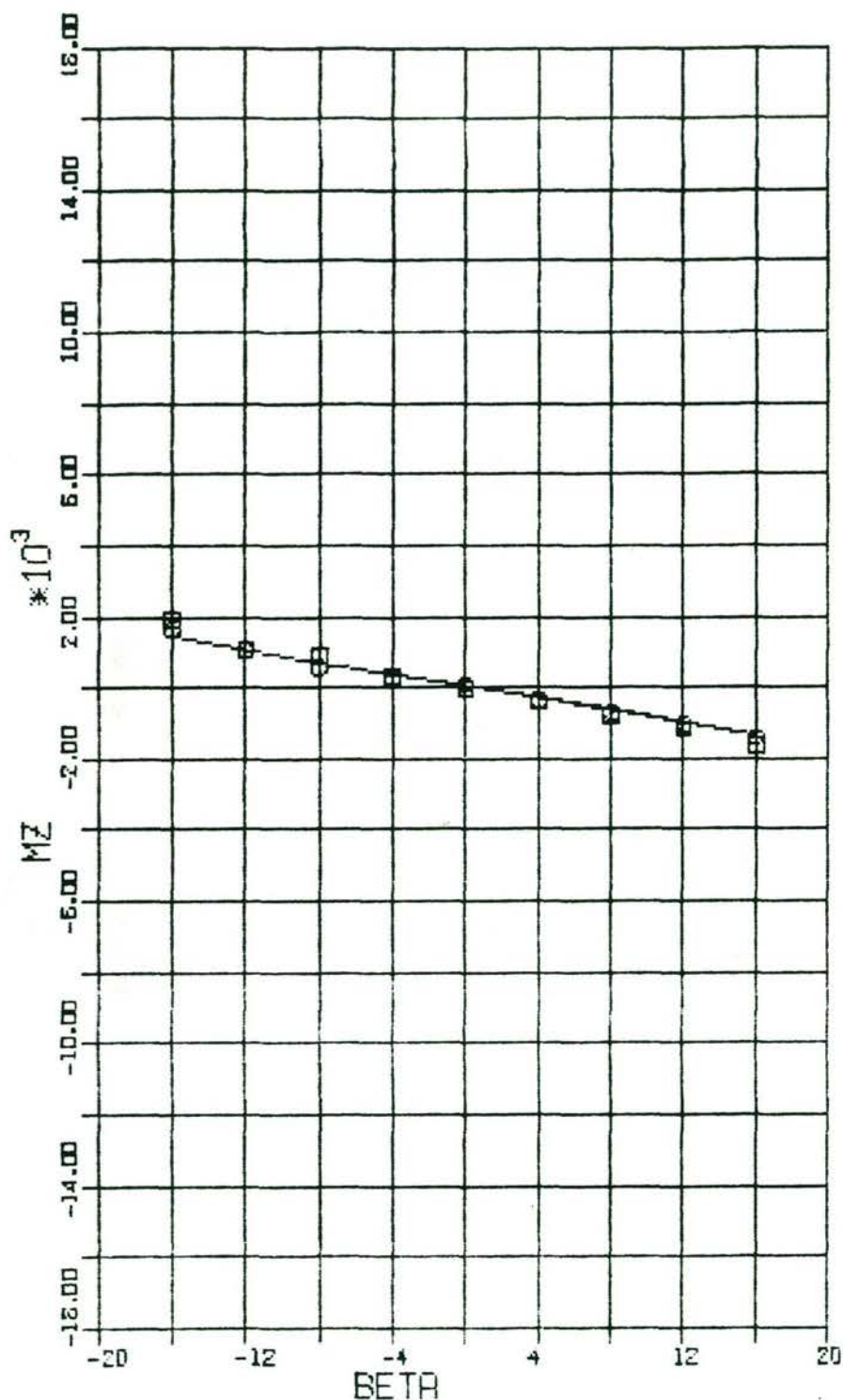
CONS S 4.3000

CONS BETA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DNU, DYN, VU, VVVUU)



DVK Projekt Windhinder

REV

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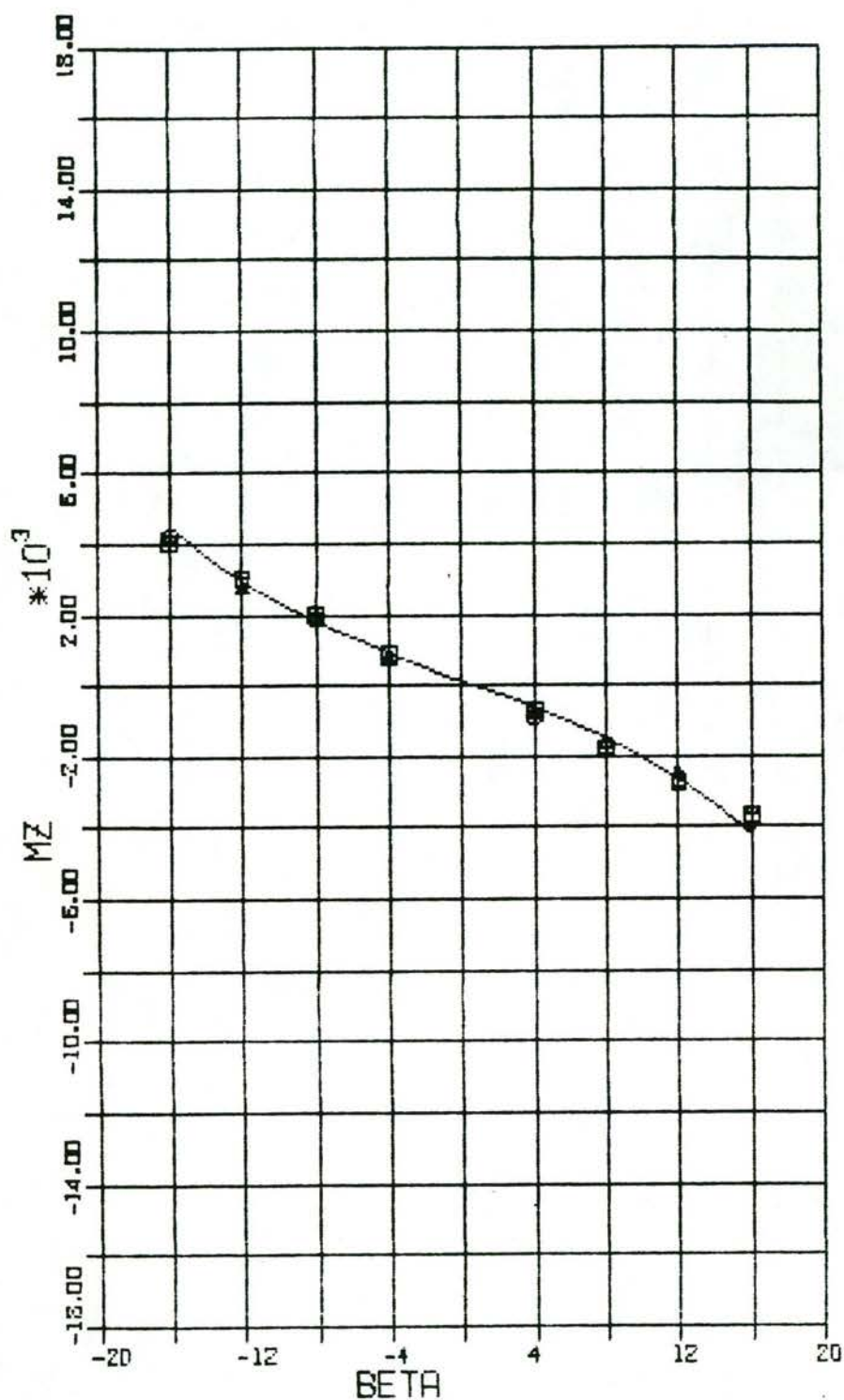
CONS S 1.5000

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNNU, DNU, DYN, VU, VVUU)



DVK Projekt Windhinder

REV

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CONS S 2.2500

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

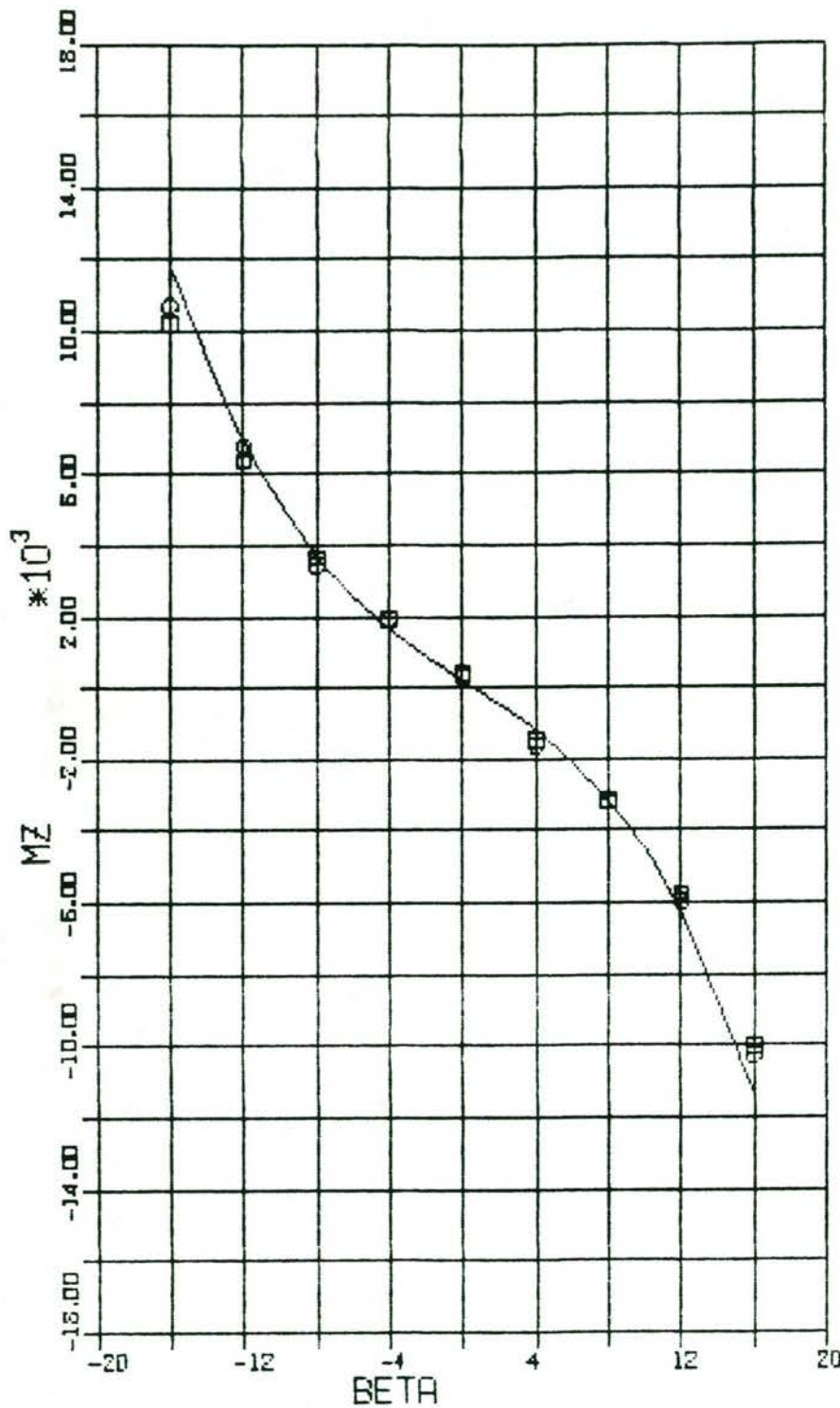
MZ = (LU, DUU, DNN, DNLU, DUU, DVN, VU, VVVUU)

DVK Projekt Windhinder

REV

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CONS S 3.0000

CONS DELTA .0000

RIJN-HERNE (BELADEN, BREED WATER)

STATISCHE PROEVEN

MZ = (UU, DUU, DNN, DNLU, DVL, DVL, VL, VVLU)

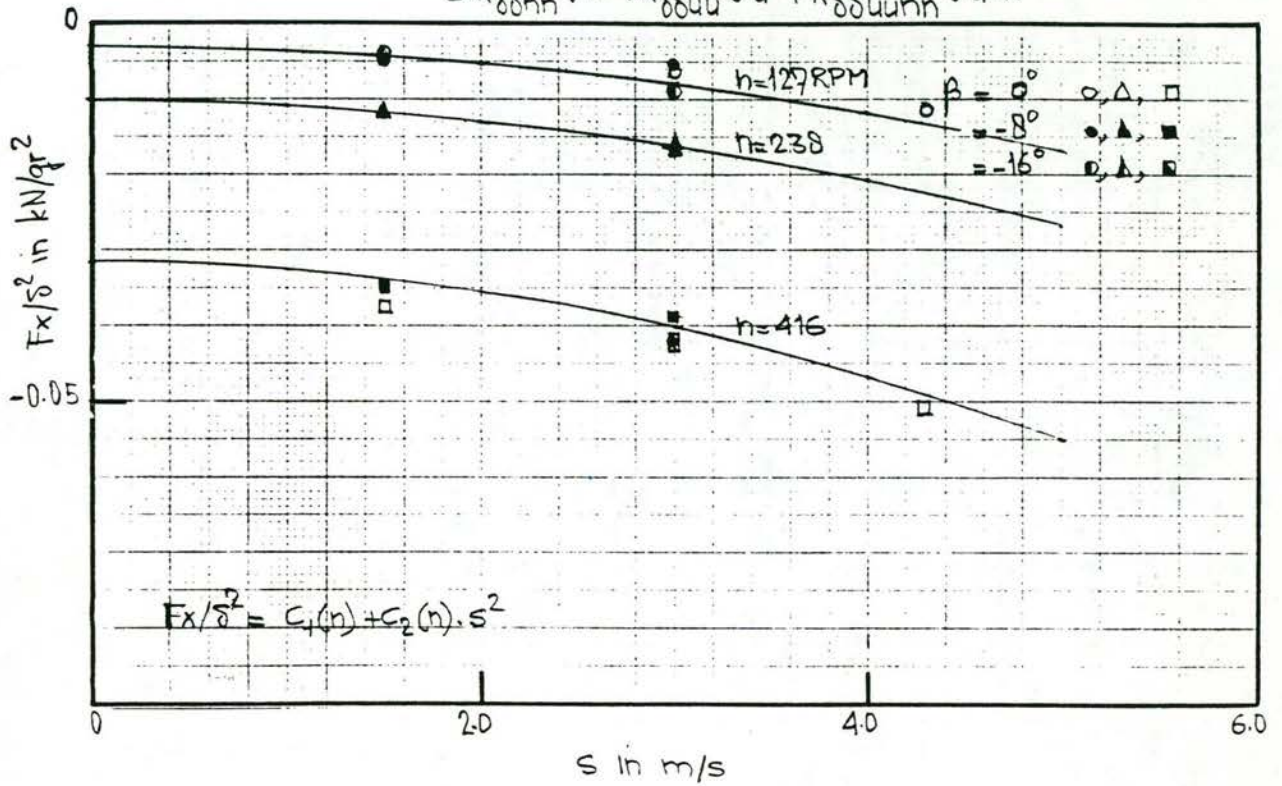
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

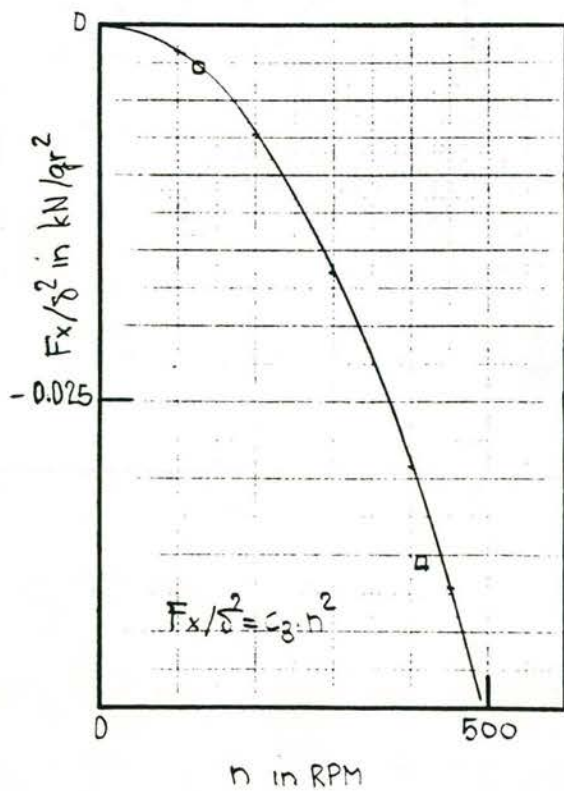
rijn-herne kanaal schip beladen, breed water

$$F_x = F_x(\delta^2) = X_{\delta\delta nn} \delta^2 \cdot n^2 + X_{\delta\delta ss} \delta^2 \cdot s^2 + X_{\delta\delta ssn} \delta^2 \cdot s^2 \cdot n^2$$

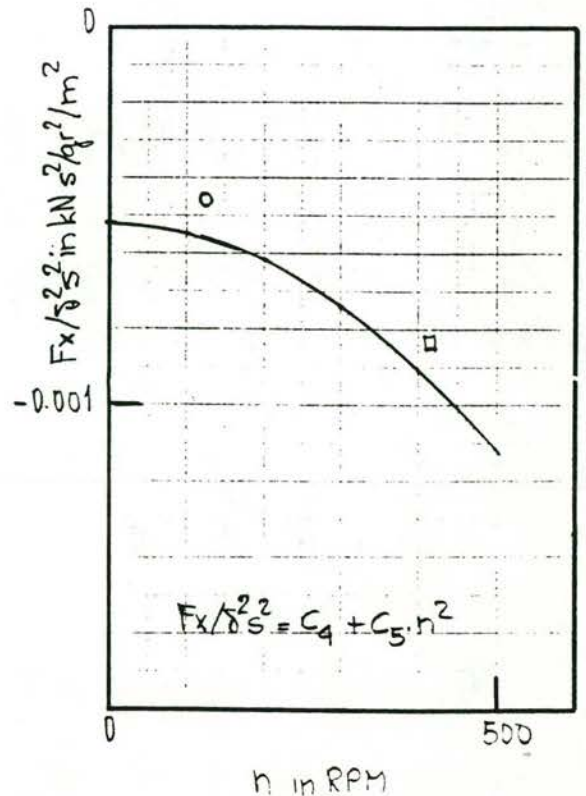
$$\hat{=} X_{\delta\delta nn} \delta^2 \cdot n^2 + X_{\delta\delta uu} \delta^2 \cdot u^2 + X_{\delta\delta uunn} \delta^2 \cdot u^2 \cdot n^2$$



$$F_x/\delta^2 = C_1(n) + C_2(n) \cdot s^2$$



$$F_x/\delta^2 = C_3 \cdot n^2$$



$$F_x/\delta^2 s^2 = C_4 + C_5 \cdot n^2$$

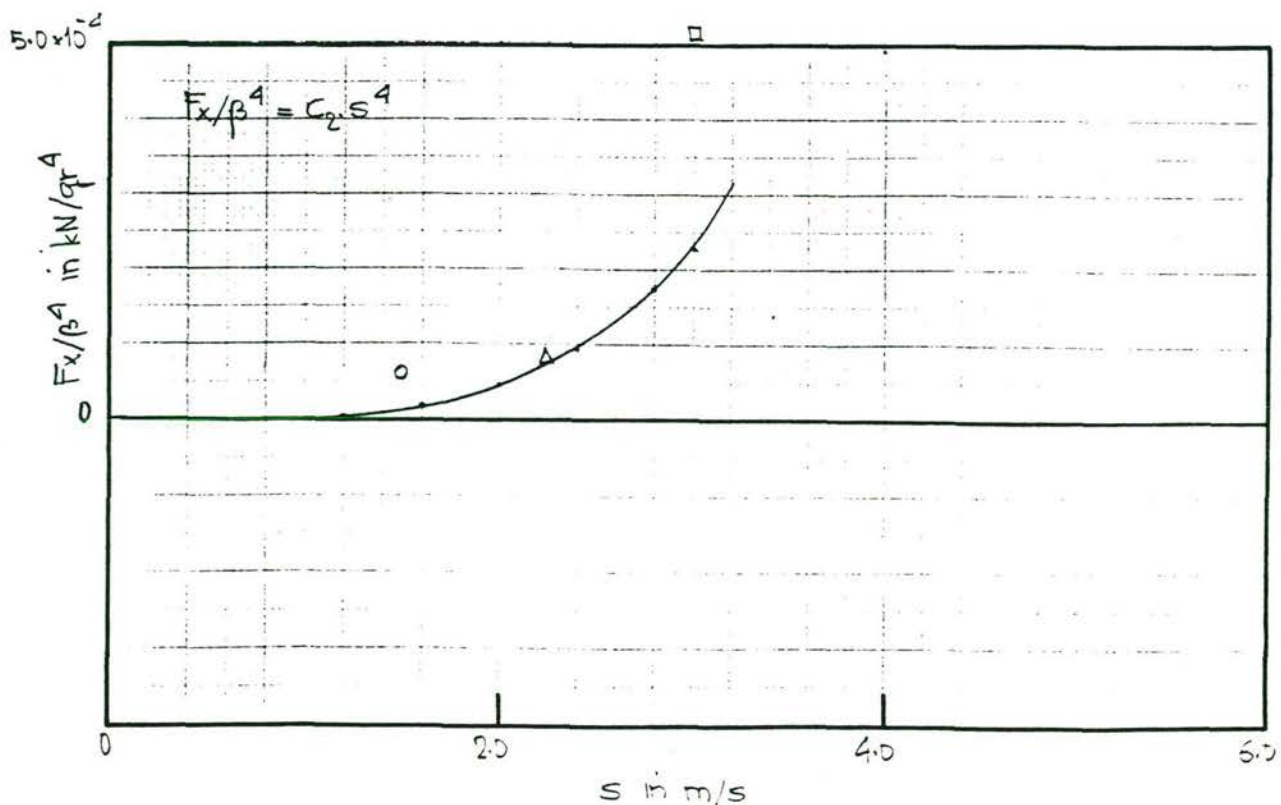
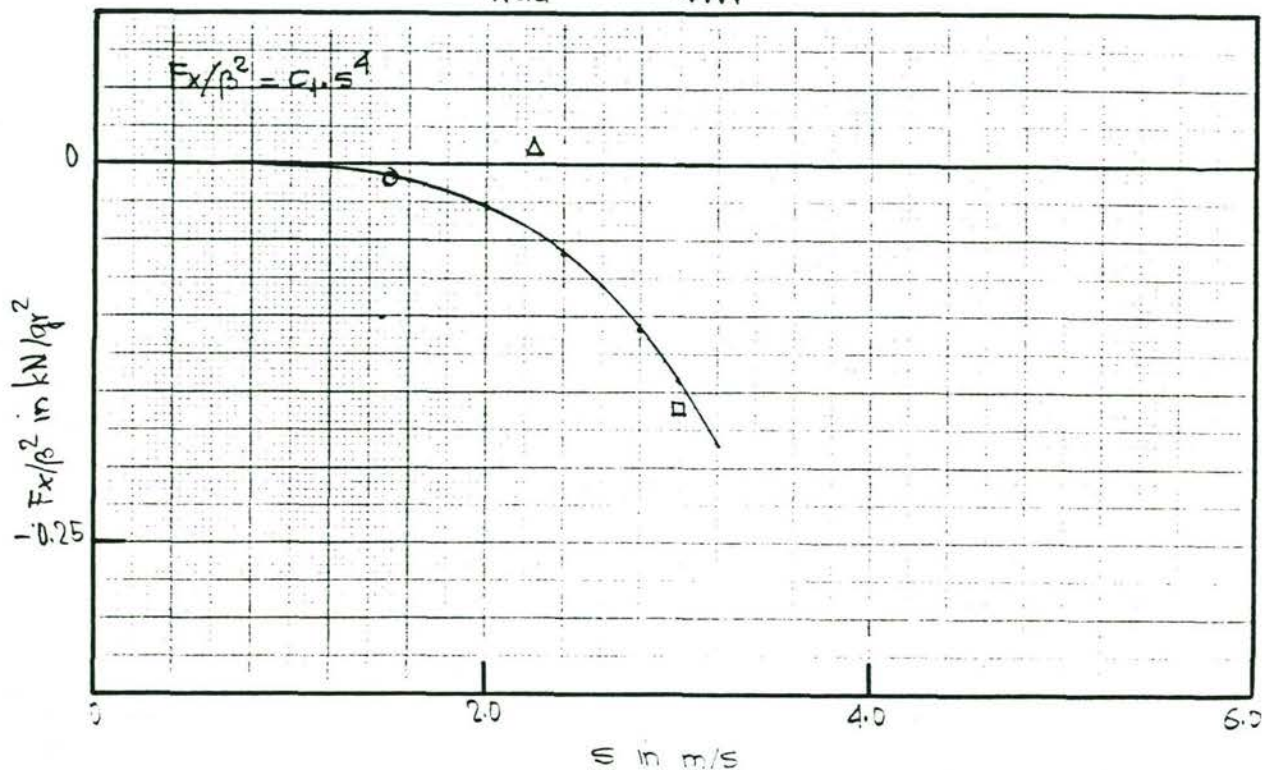
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_x(\delta=0) = X_{\beta\beta\beta\beta\beta\beta} \cdot \beta^2 \cdot s^4 + X_{\beta\beta\beta\beta\beta\beta\beta\beta} \cdot \beta^4 \cdot s^4$$

$$\hat{=} X_{VVUU} \cdot v^2 u^2 + X_{VVVV} \cdot v^4$$



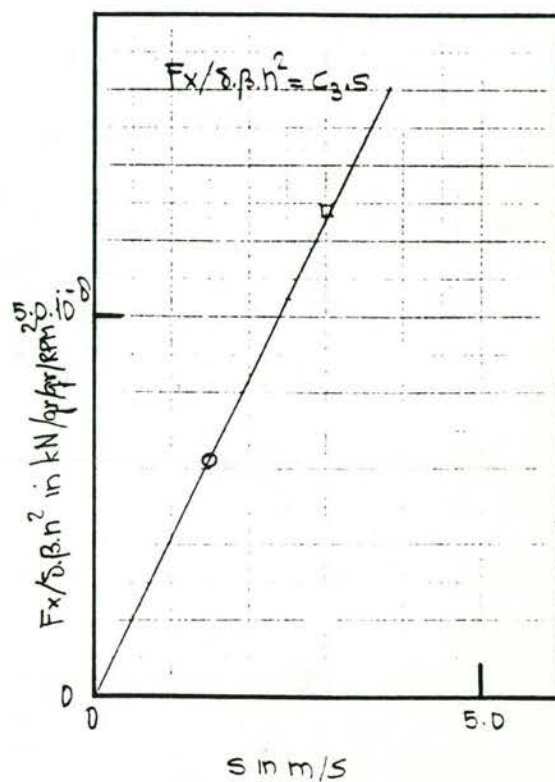
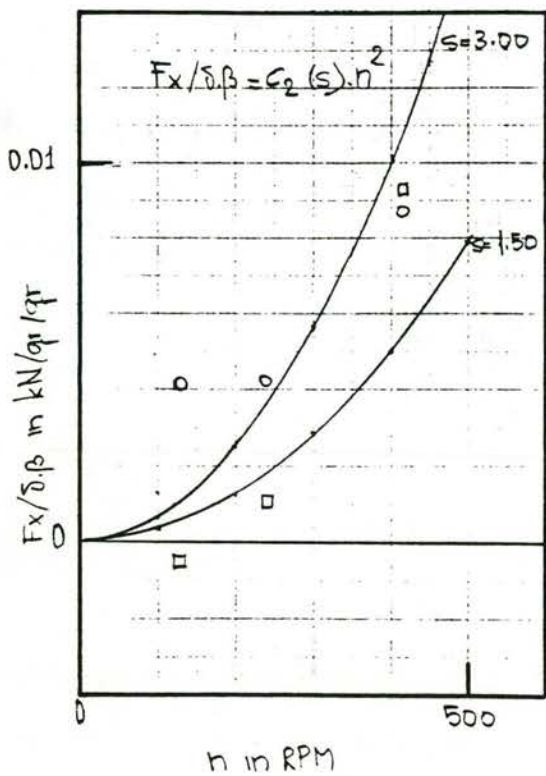
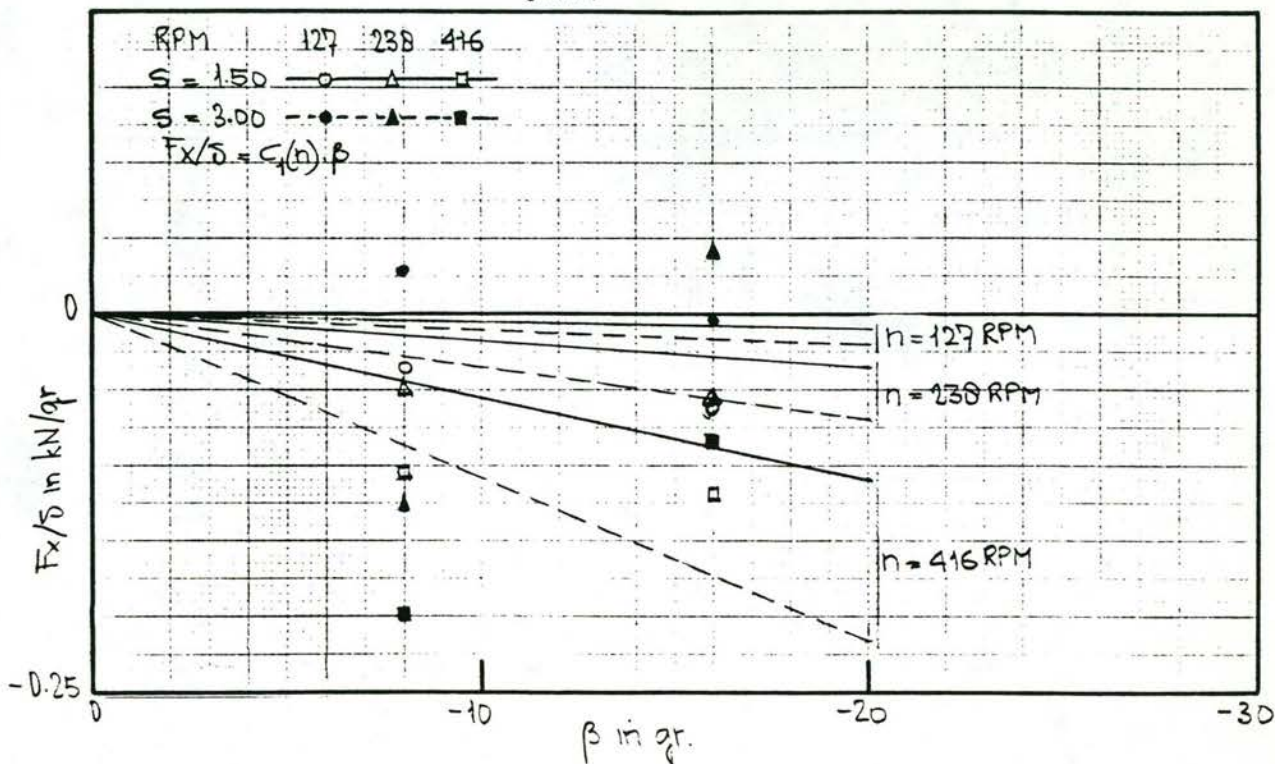
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_x = F_x(\delta) = X_{\delta} \beta n n s \cdot \delta \beta n^2 s$$

$$\hat{=} X_{\delta} v n n \cdot \delta v n^2$$

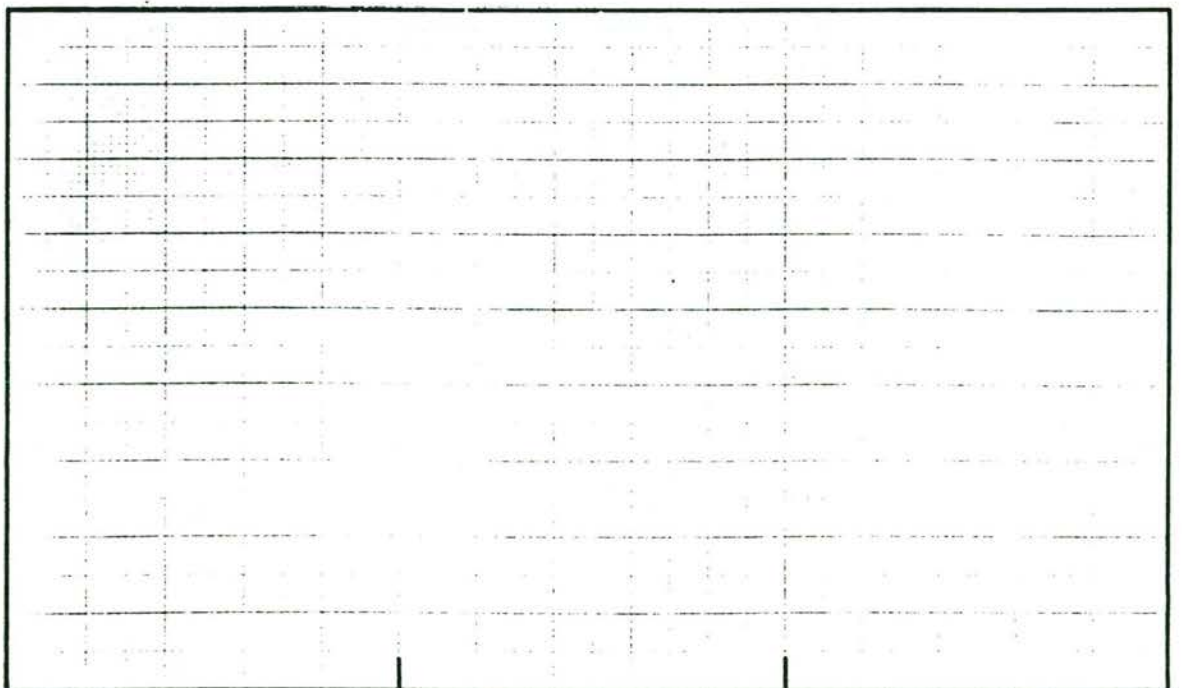
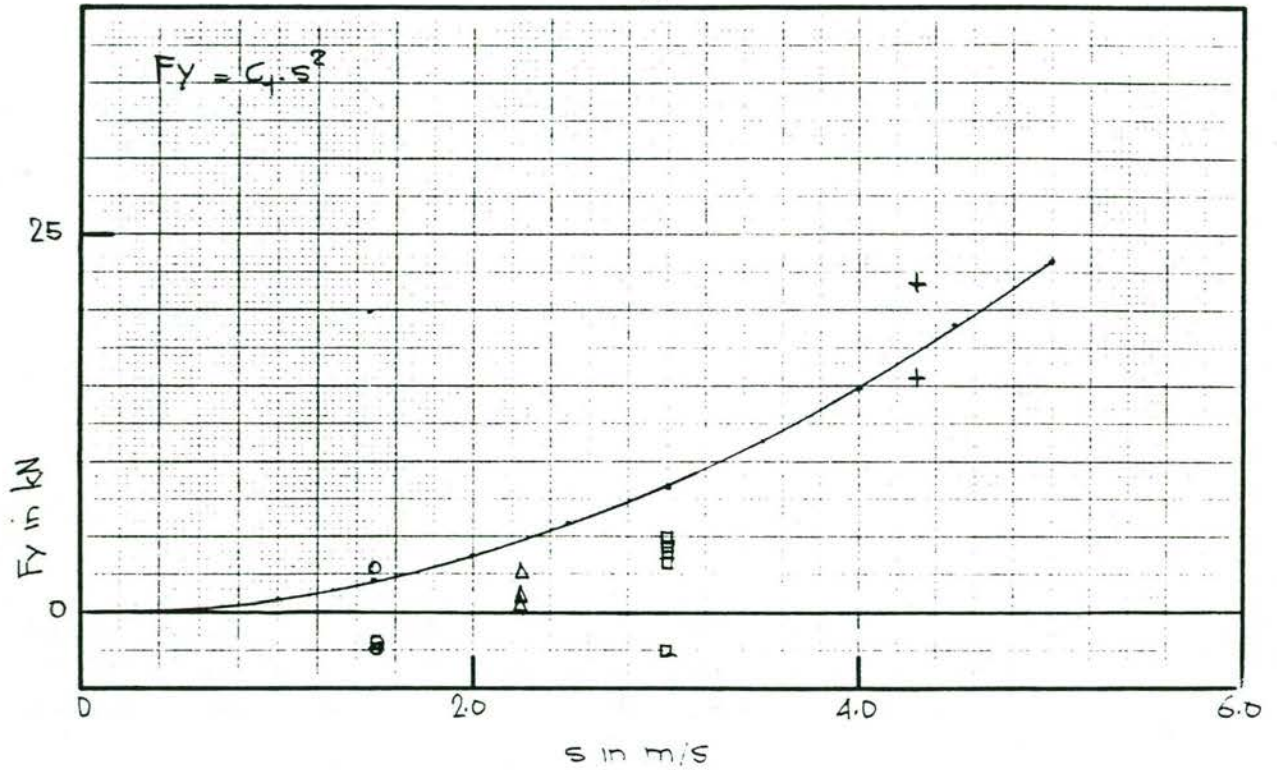


DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(\delta=0, \beta=0) = Y_{ss} \cdot s^2 \\ \hat{=} Y_{uu} \cdot u^2$$



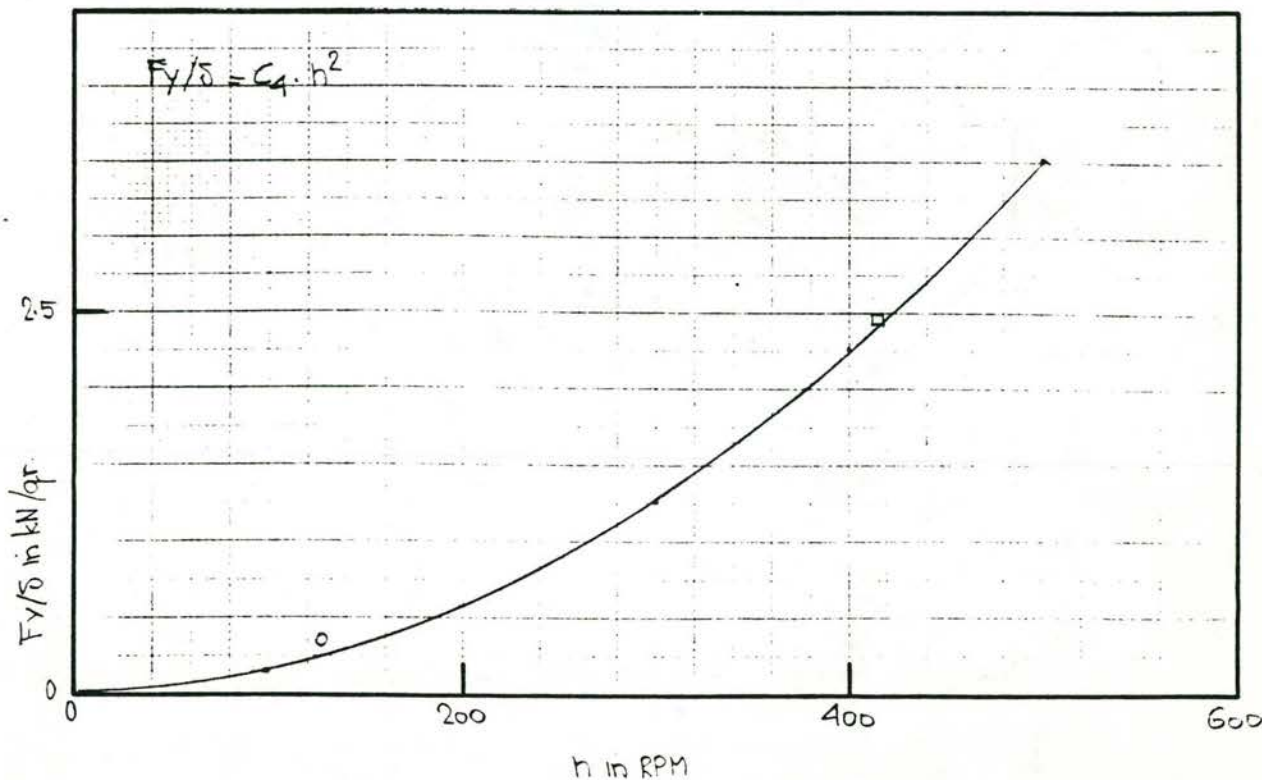
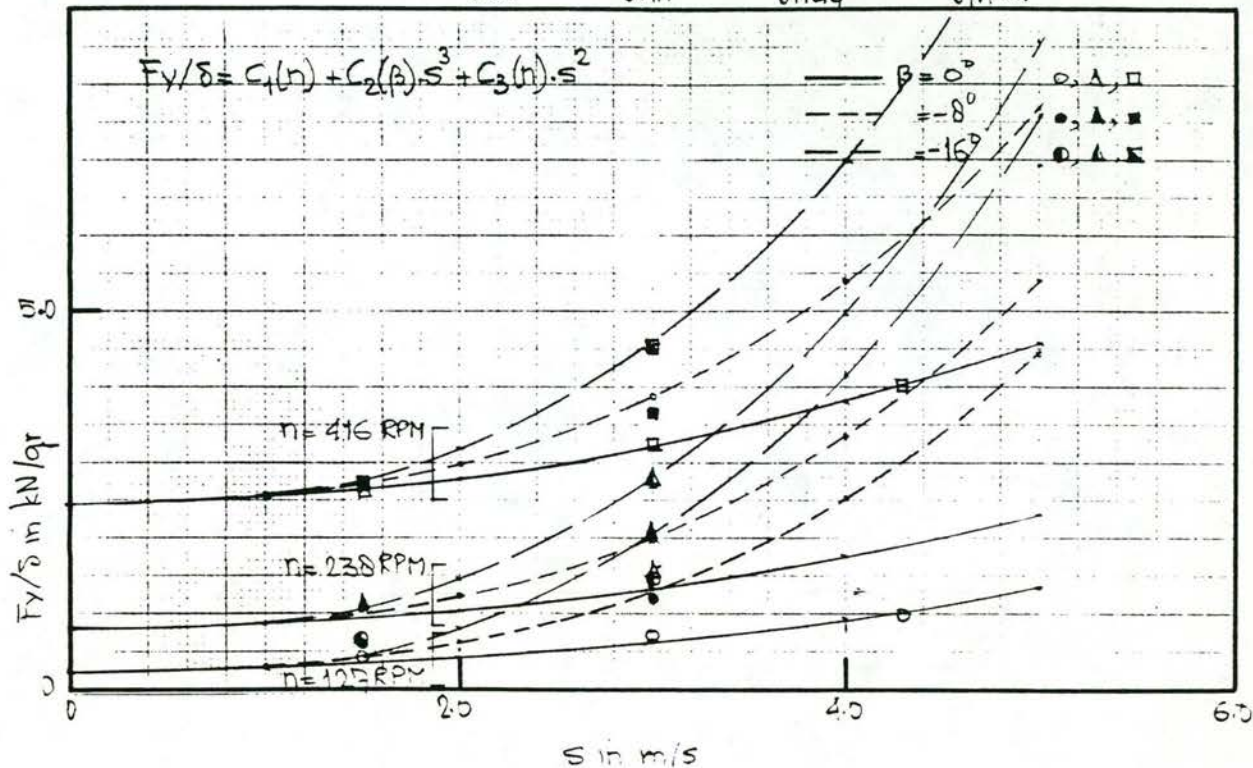
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y = F_y(\delta) = Y_{\delta ss} \cdot \delta \cdot s^2 + Y_{\delta nn} \cdot \delta \cdot n^2 + Y_{\delta nss} \cdot \delta \cdot n \cdot s^2 + Y_{\delta |n|ss} \cdot \delta |n| \cdot s^2$$

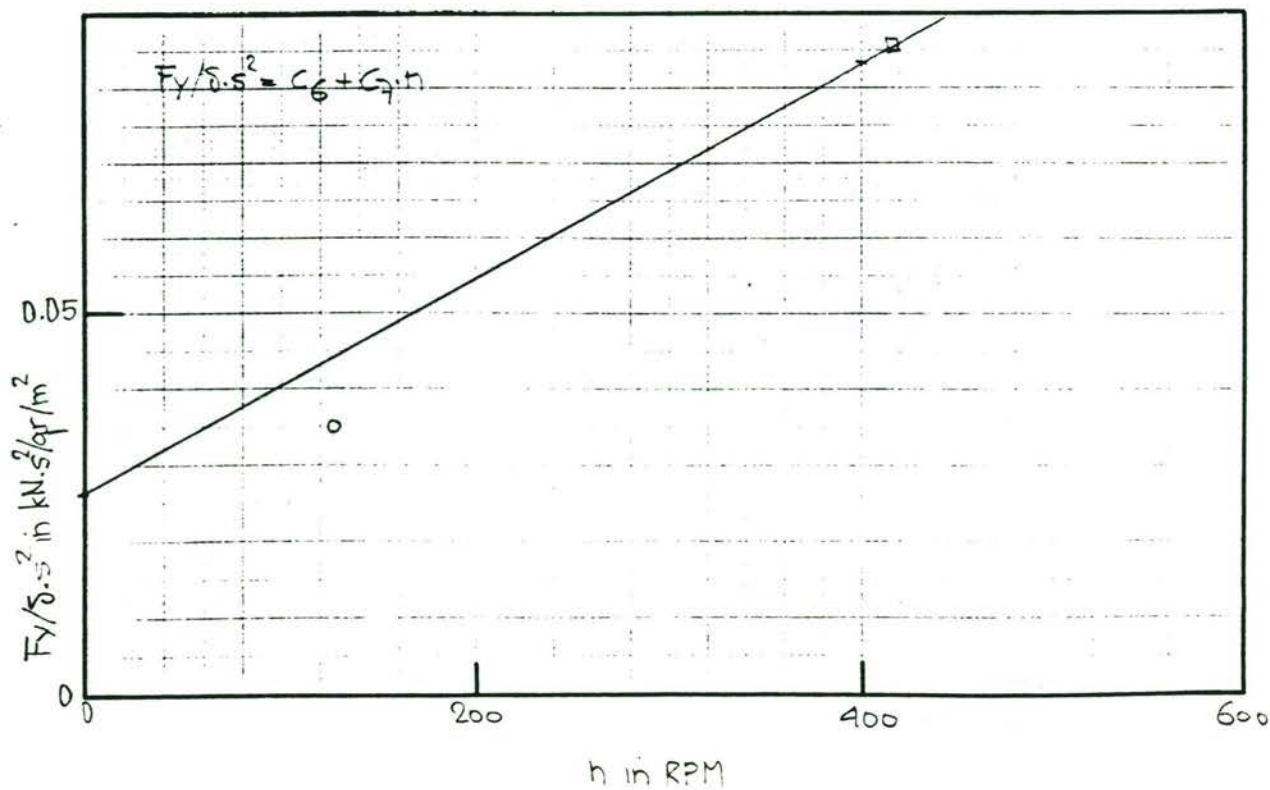
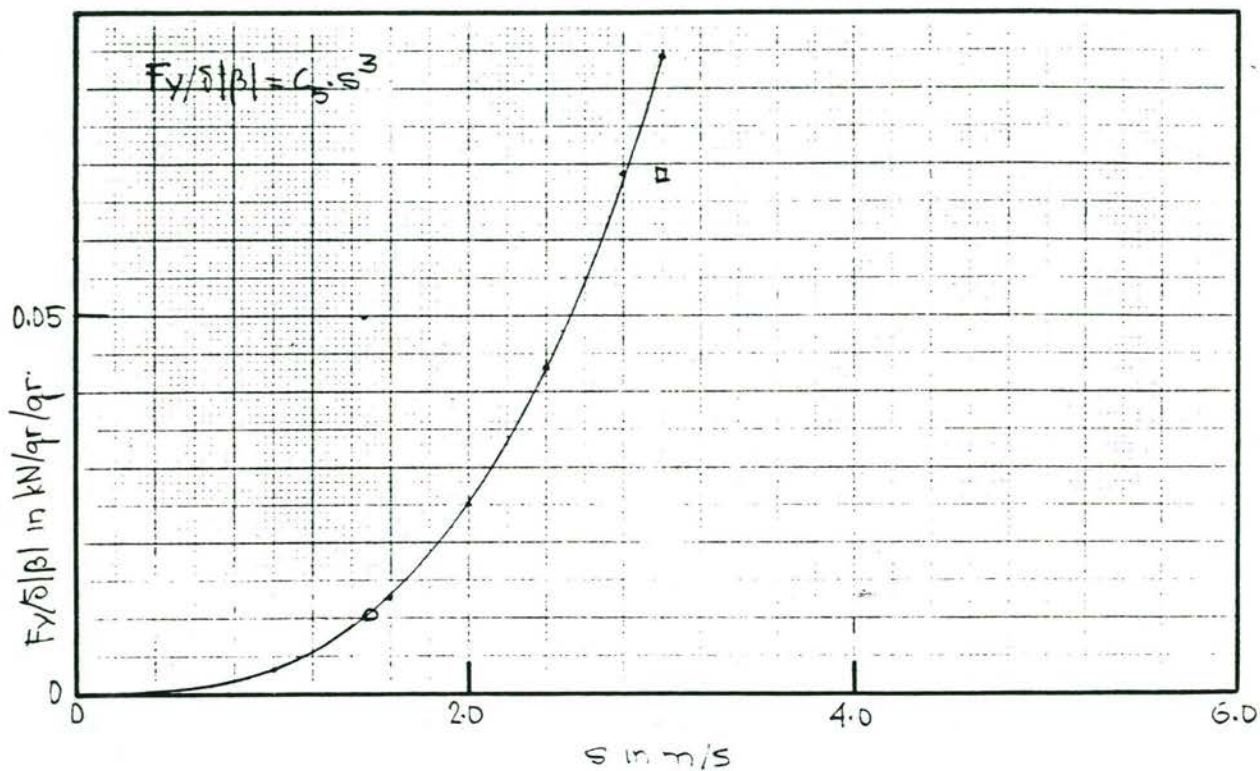
$$\hat{=} Y_{\delta uu} \cdot \delta \cdot u^2 + Y_{\delta nn} \cdot \delta \cdot n^2 + Y_{\delta nuu} \cdot \delta \cdot n \cdot u^2 + Y_{\delta |n|uu} \cdot \delta |n| \cdot u^2$$



DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water



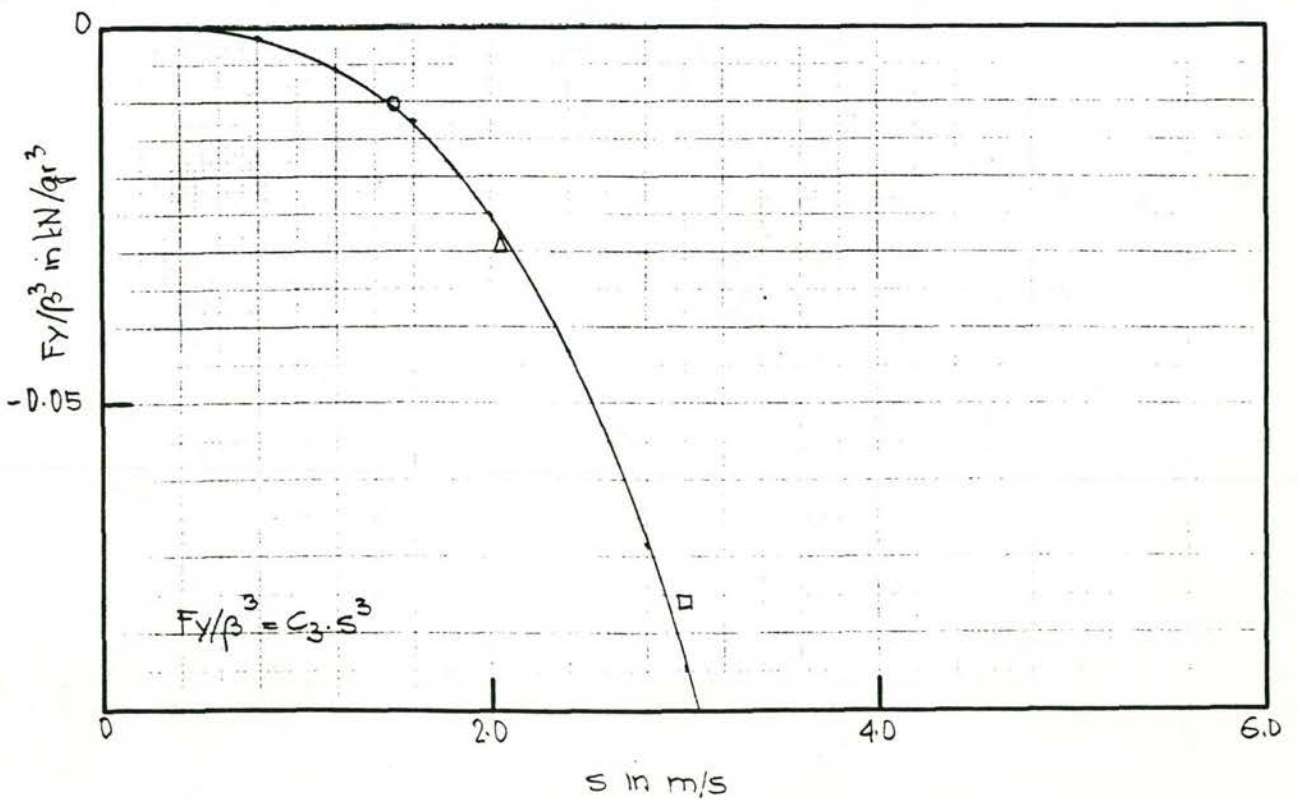
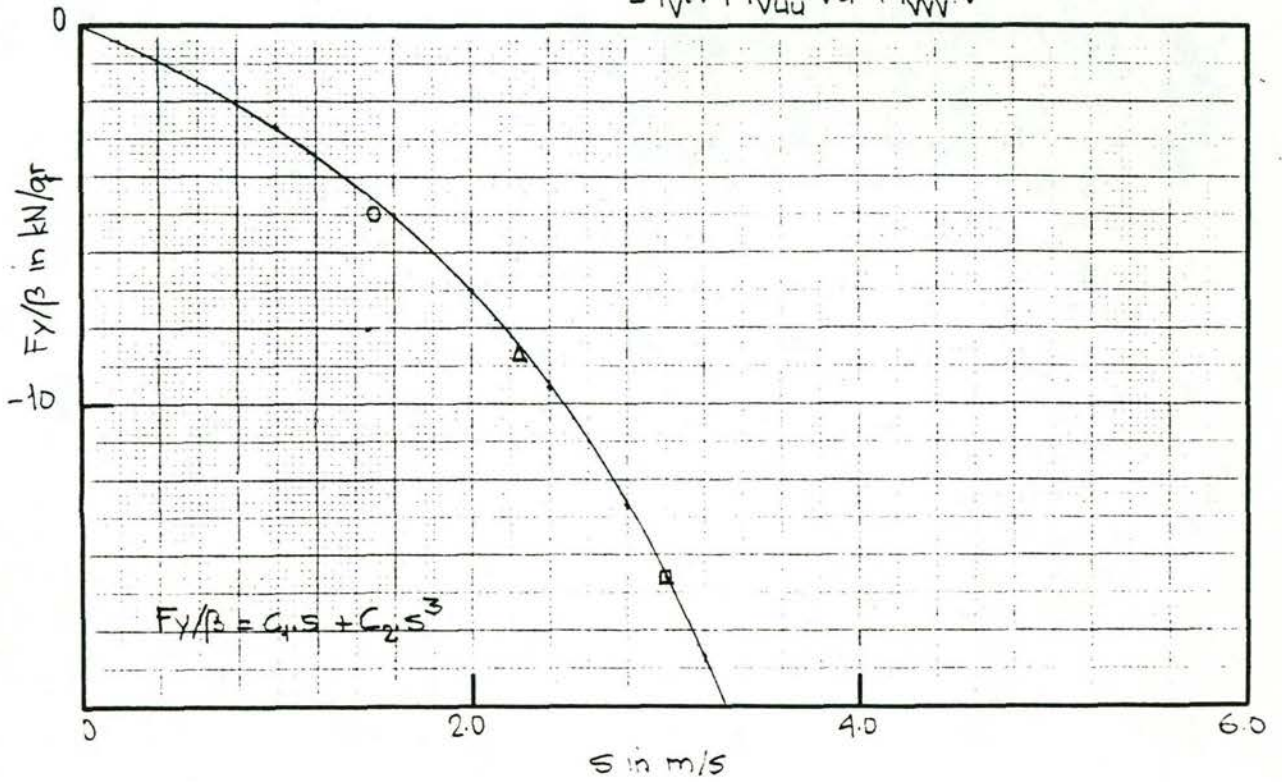
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(\delta=0) = F_y(\beta) + F_y(\beta^3) = Y_{\beta s} \cdot \beta \cdot s + Y_{\beta s s s} \beta \cdot s^3 + Y_{\beta \beta \beta s s s} \beta^3 s^3$$

$$\hat{=} Y_v \cdot v + Y_{v v v} \cdot v^3 + Y_{w w w} \cdot v^3$$



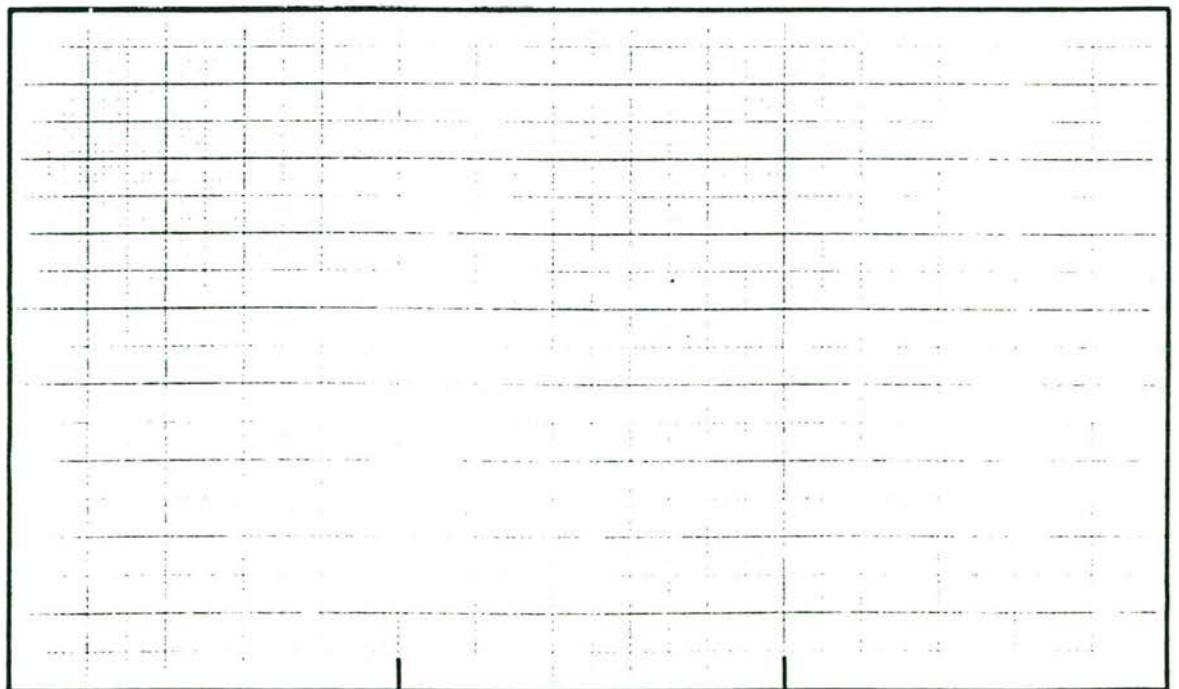
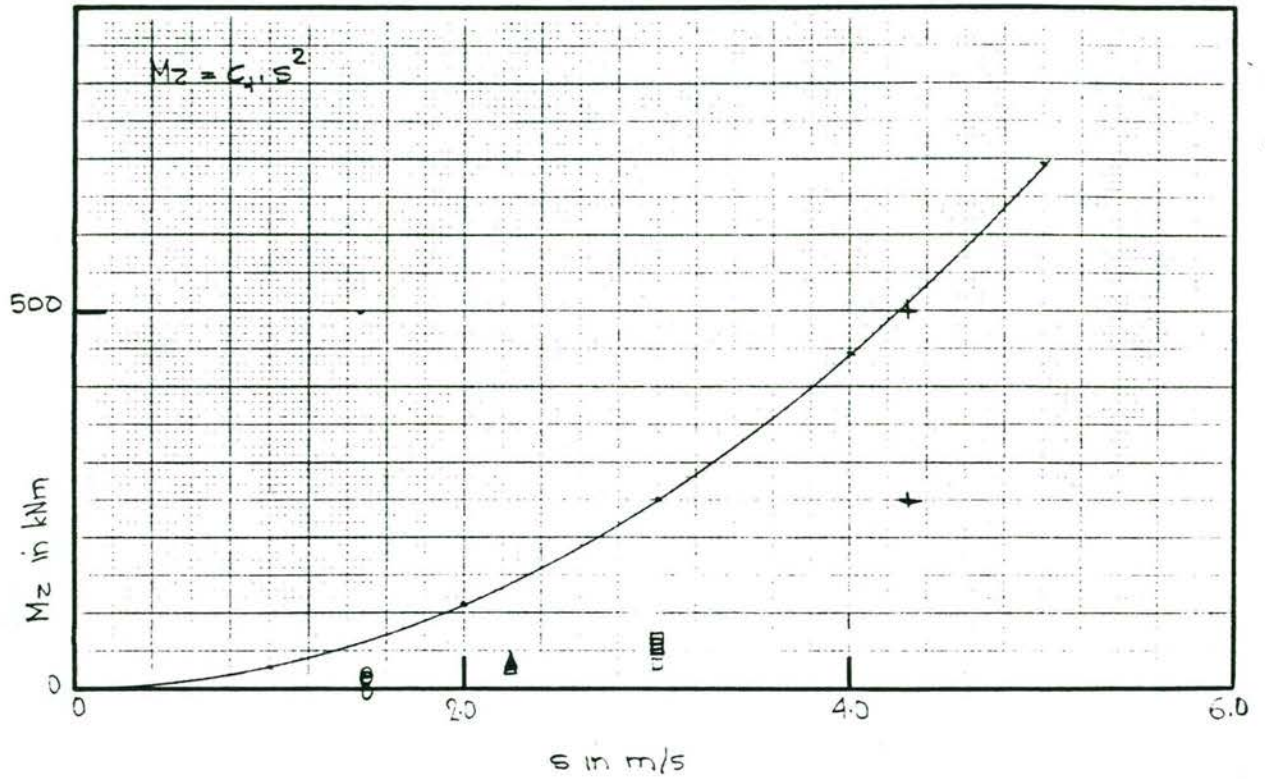
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$M_y(\delta=0, \beta=0) = N_{ss} \cdot s^2$$

$$\hat{=} N_{uu} \cdot u^2$$



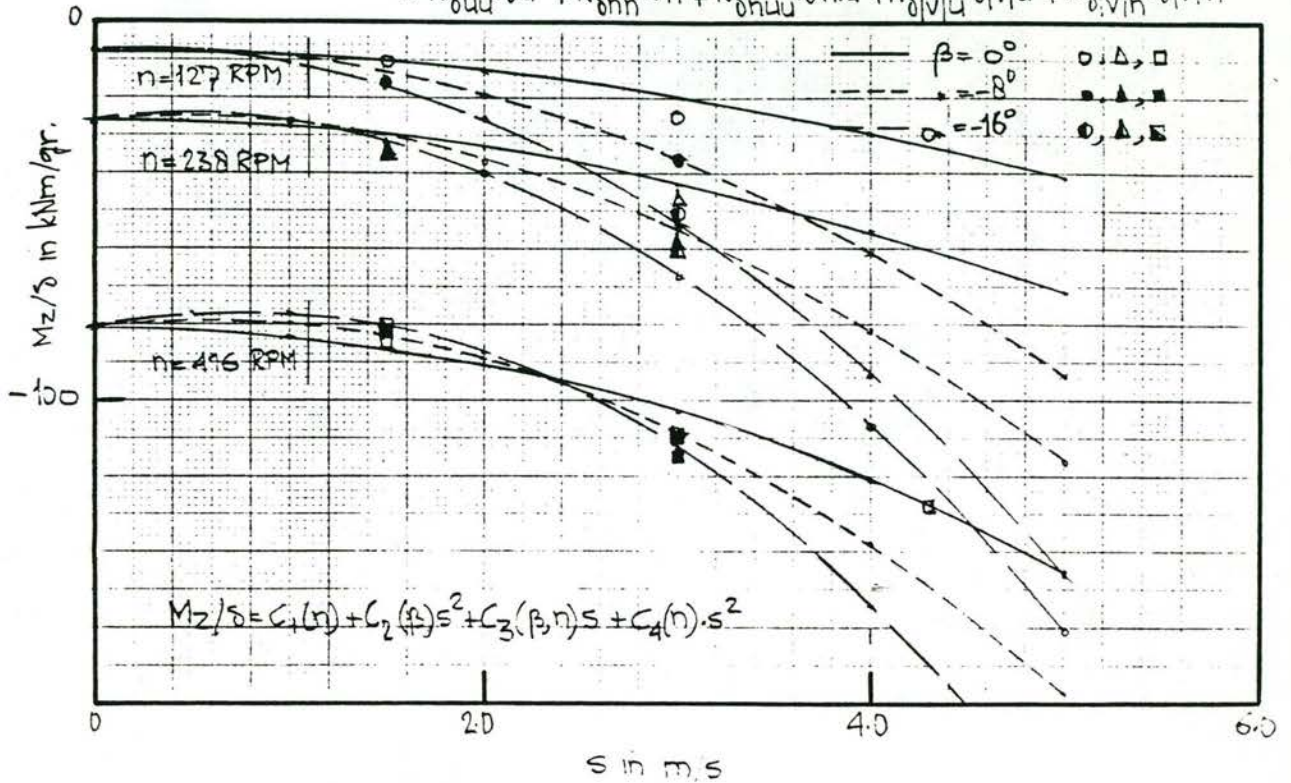
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

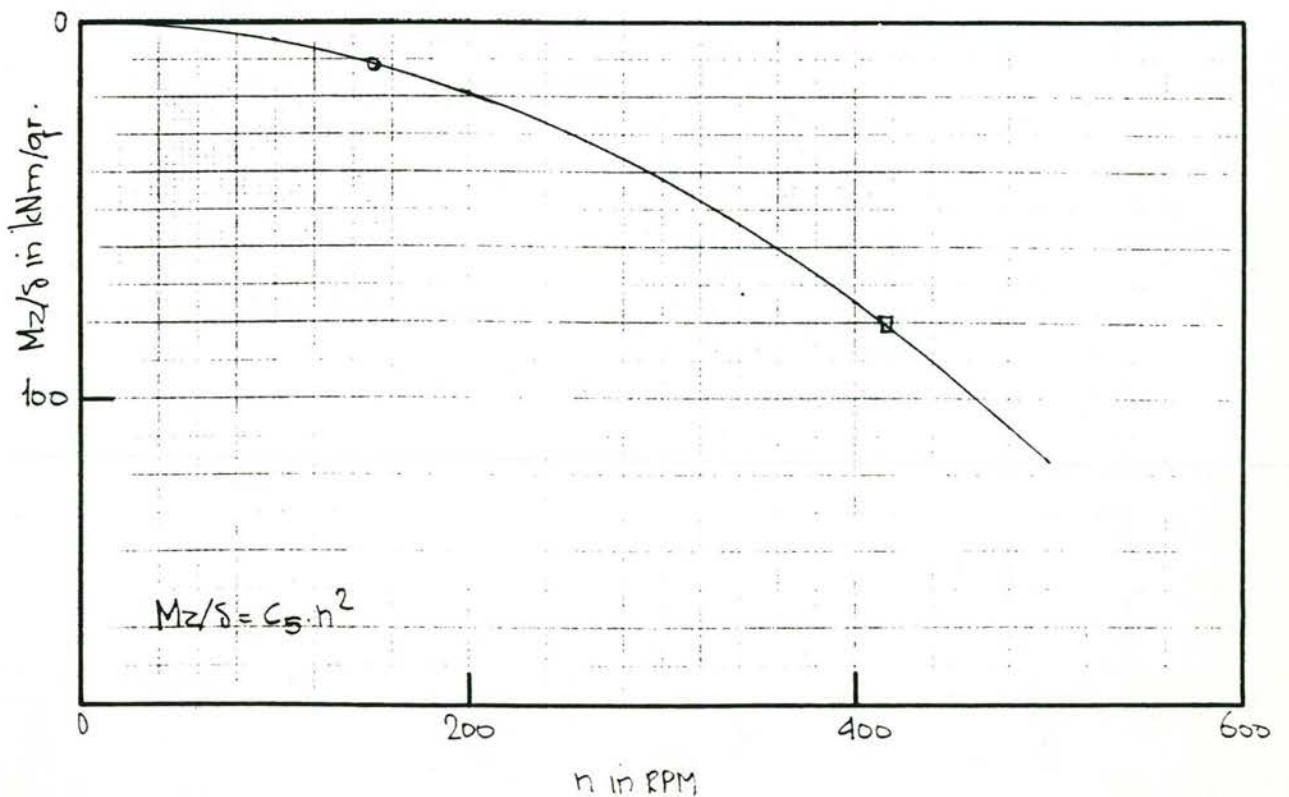
rijn-herne kanaal schip beladen, breed water

$$M_z = M_z(\delta) = N_{\delta ss} \cdot \delta \cdot s^2 + N_{\delta nn} \cdot \delta \cdot n^2 + N_{\delta nss} \cdot \delta \cdot n \cdot s^2 + N_{\delta |\beta| ss} \cdot \delta |\beta| s^2 + N_{\delta |\beta|' sn} \cdot \delta |\beta|' s \cdot n$$

$$\hat{=} N_{\delta uu} \cdot \delta \cdot u^2 + N_{\delta nn} \cdot \delta \cdot n^2 + N_{\delta nuu} \cdot \delta \cdot n \cdot u^2 + N_{\delta |v| u} \cdot \delta |v| u + N_{\delta |v| n} \cdot \delta |v| n$$



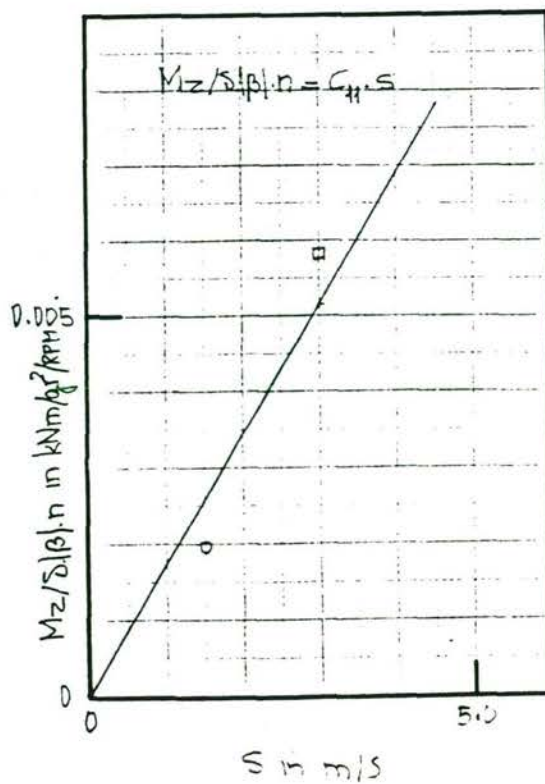
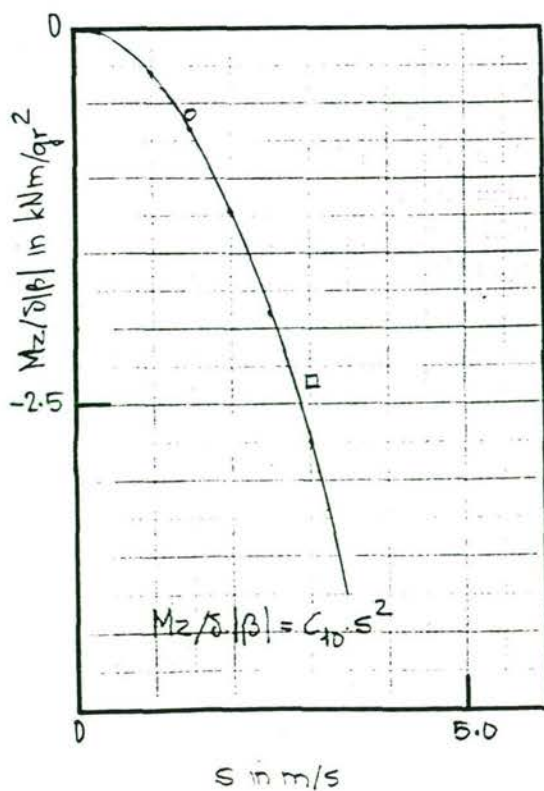
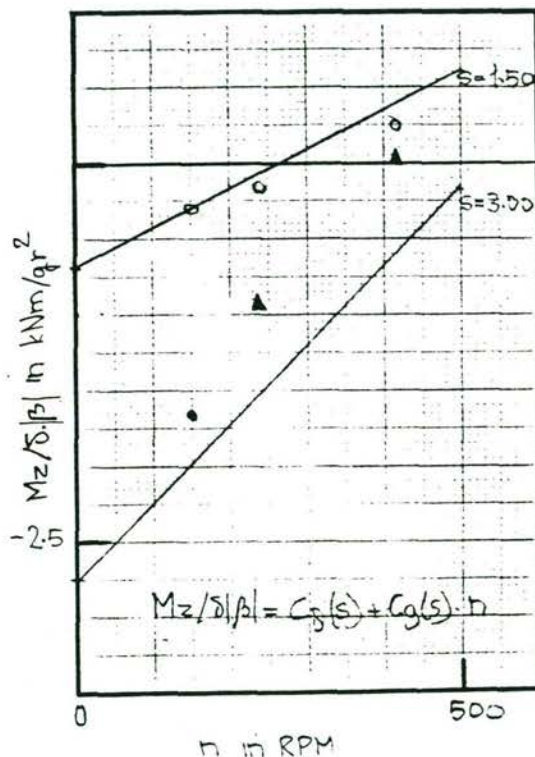
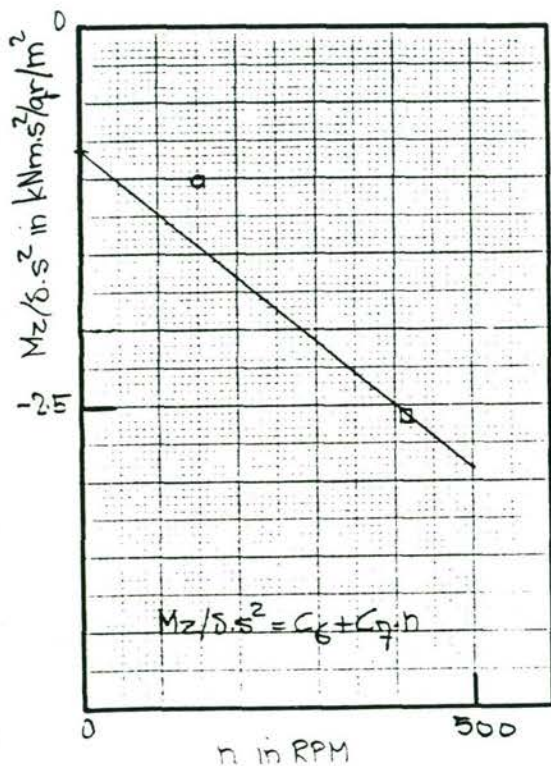
$$M_z/s = C_1(n) + C_2(\beta) s^2 + C_3(\beta, n) s + C_4(n) \cdot s^2$$



DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water



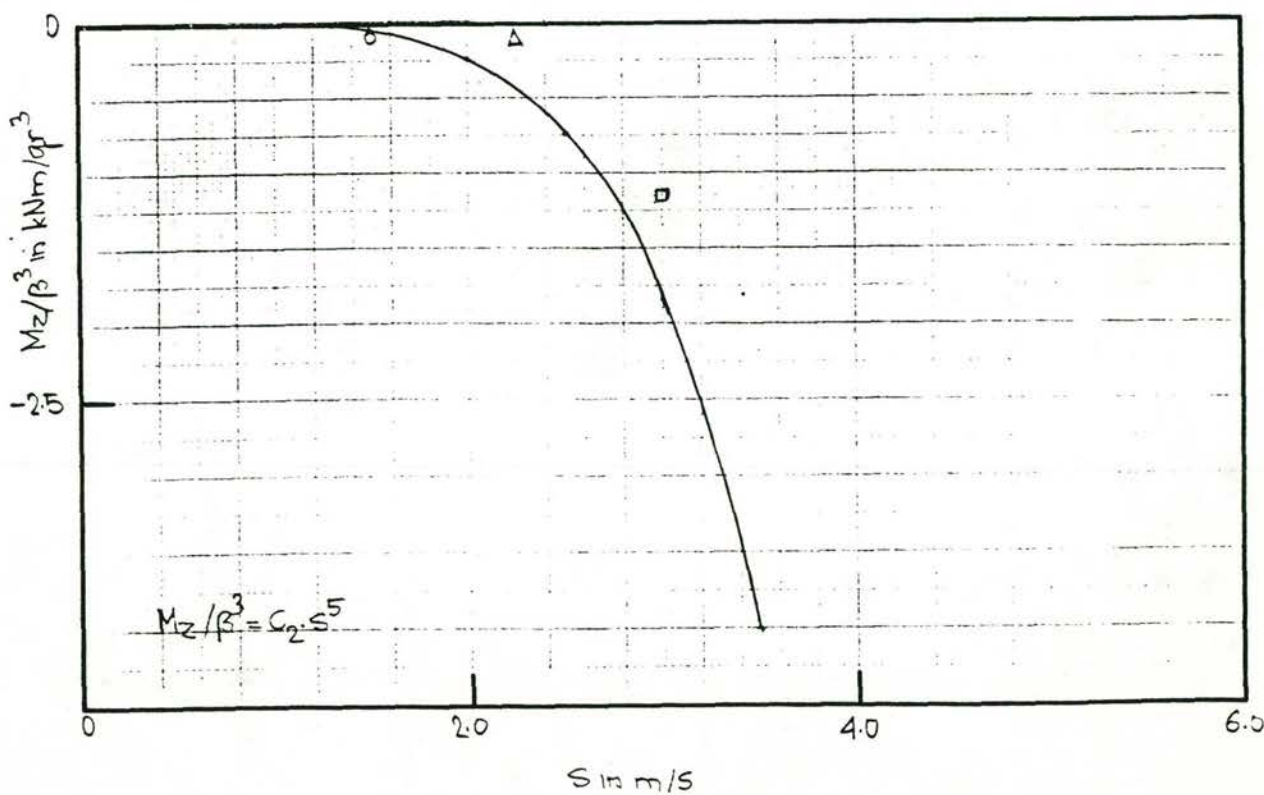
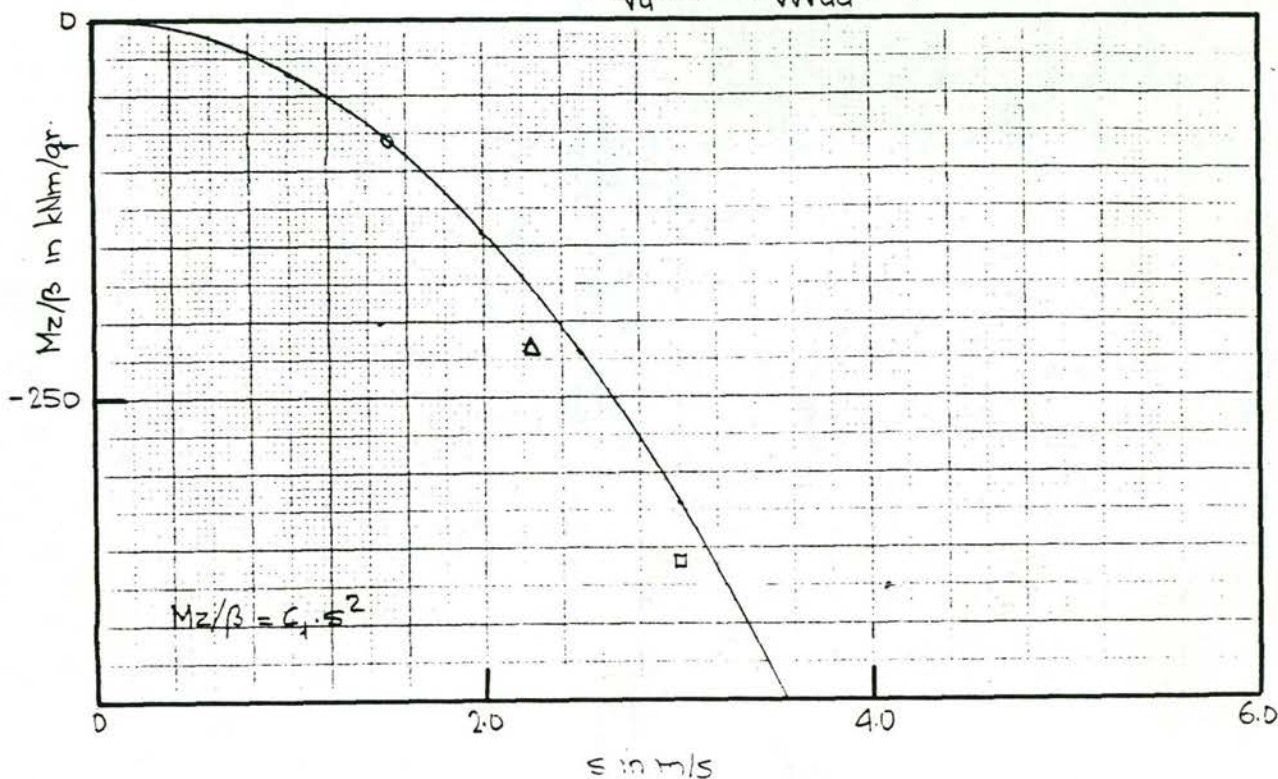
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip beladen, breed water

$$M_z(\delta=0) = M_z(\beta) + M_z(\beta^3) = N_{\beta s s} \cdot \beta \cdot s^2 + N_{\beta^3 s s s s s} \cdot \beta^3 \cdot s^5$$

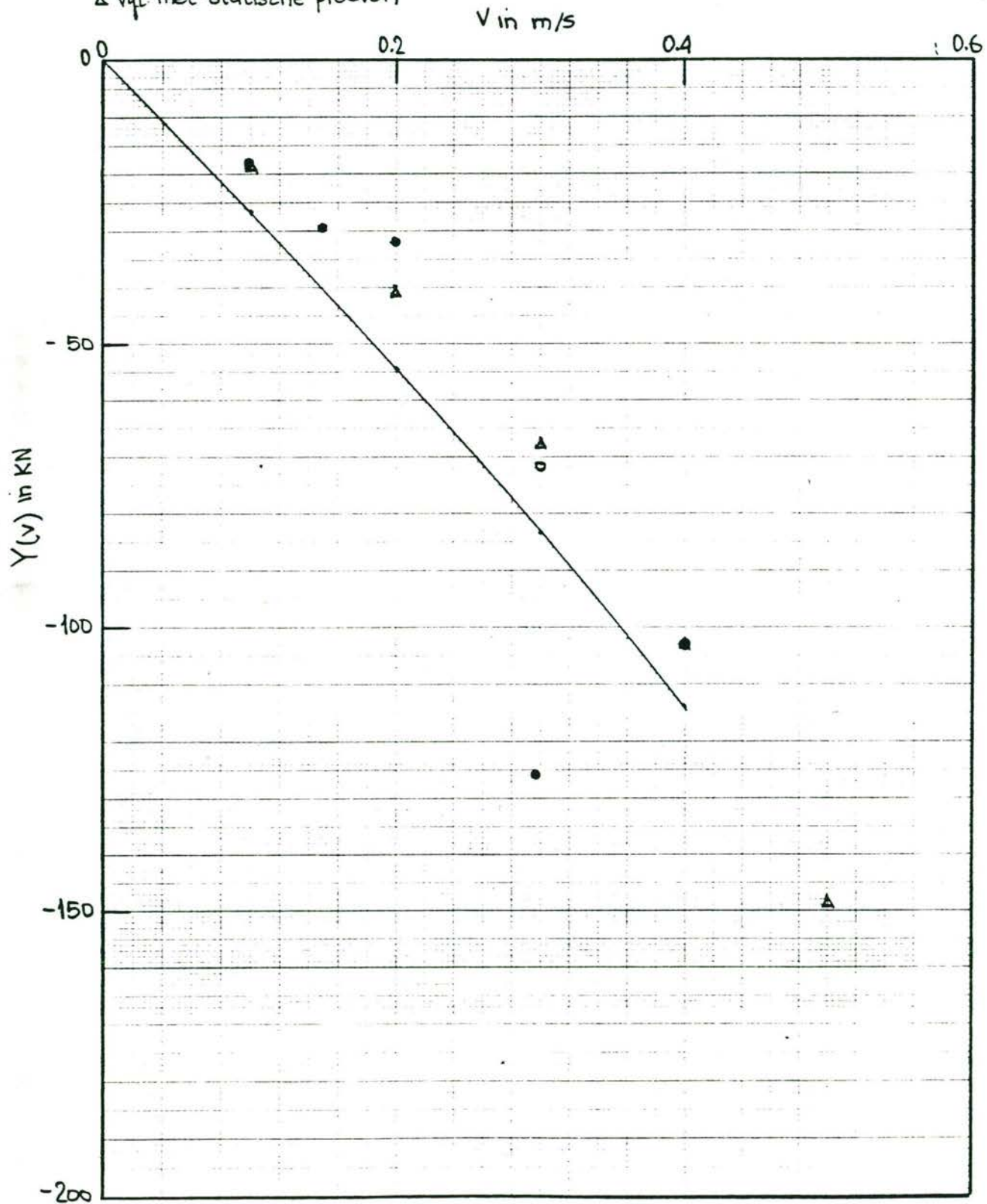
$$\hat{=} N_{vu} \cdot v \cdot u + N_{vvvu} \cdot v^3 \cdot u^2$$



DVK Projekt Windhinder
rijn-herne: beladen, breed water

VERZET OSCILLATIE PROEVEN

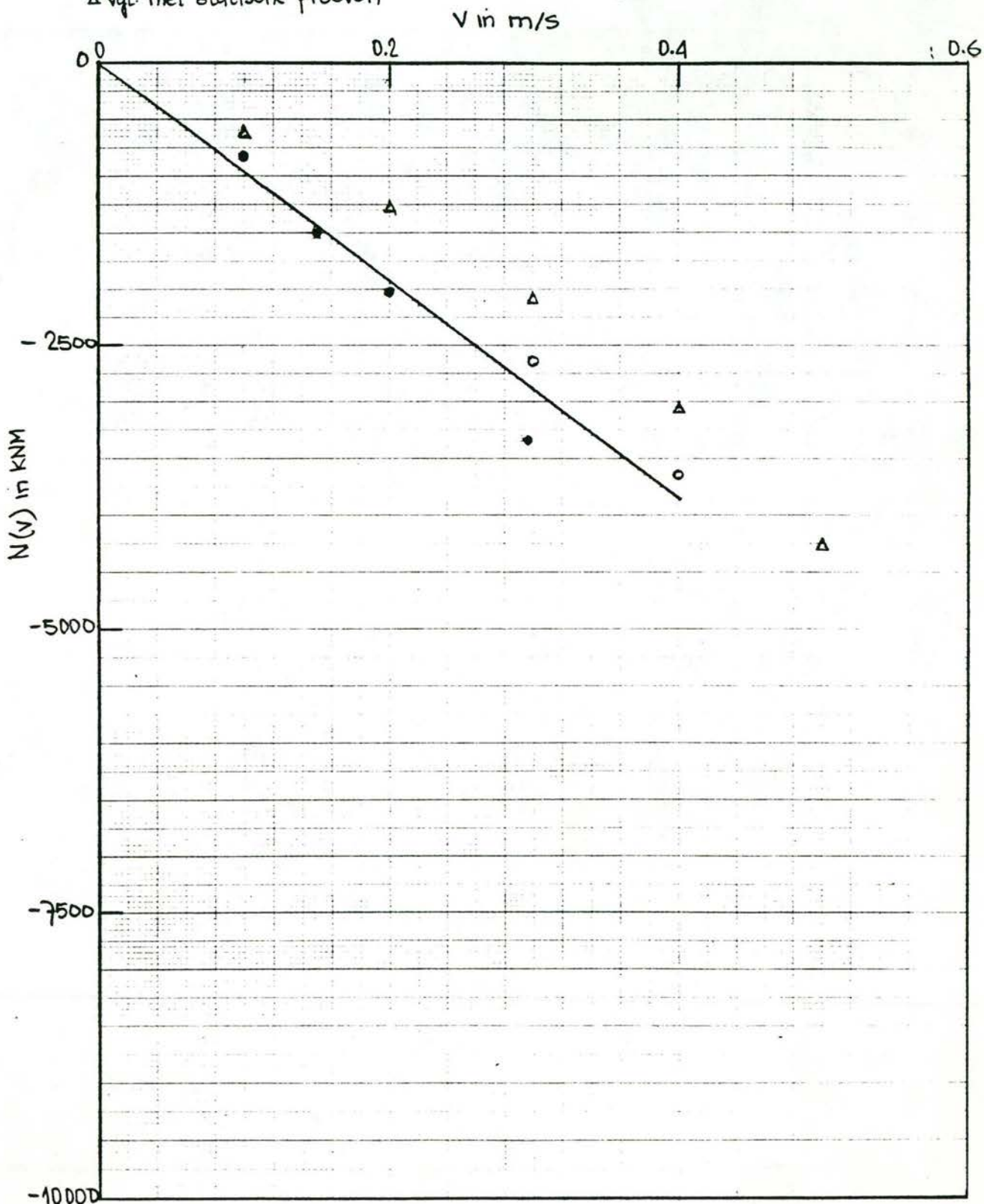
snelheid : U= 3.00 m/s
amplitude 2.50 meter : ●
amplitude 5.00 meter : ○
Δ vgl. met statische proeven



DVK Projekt Windhinder
rijn-herne: beladen, breed water

VERZET OSCILLATIE PROEVEN

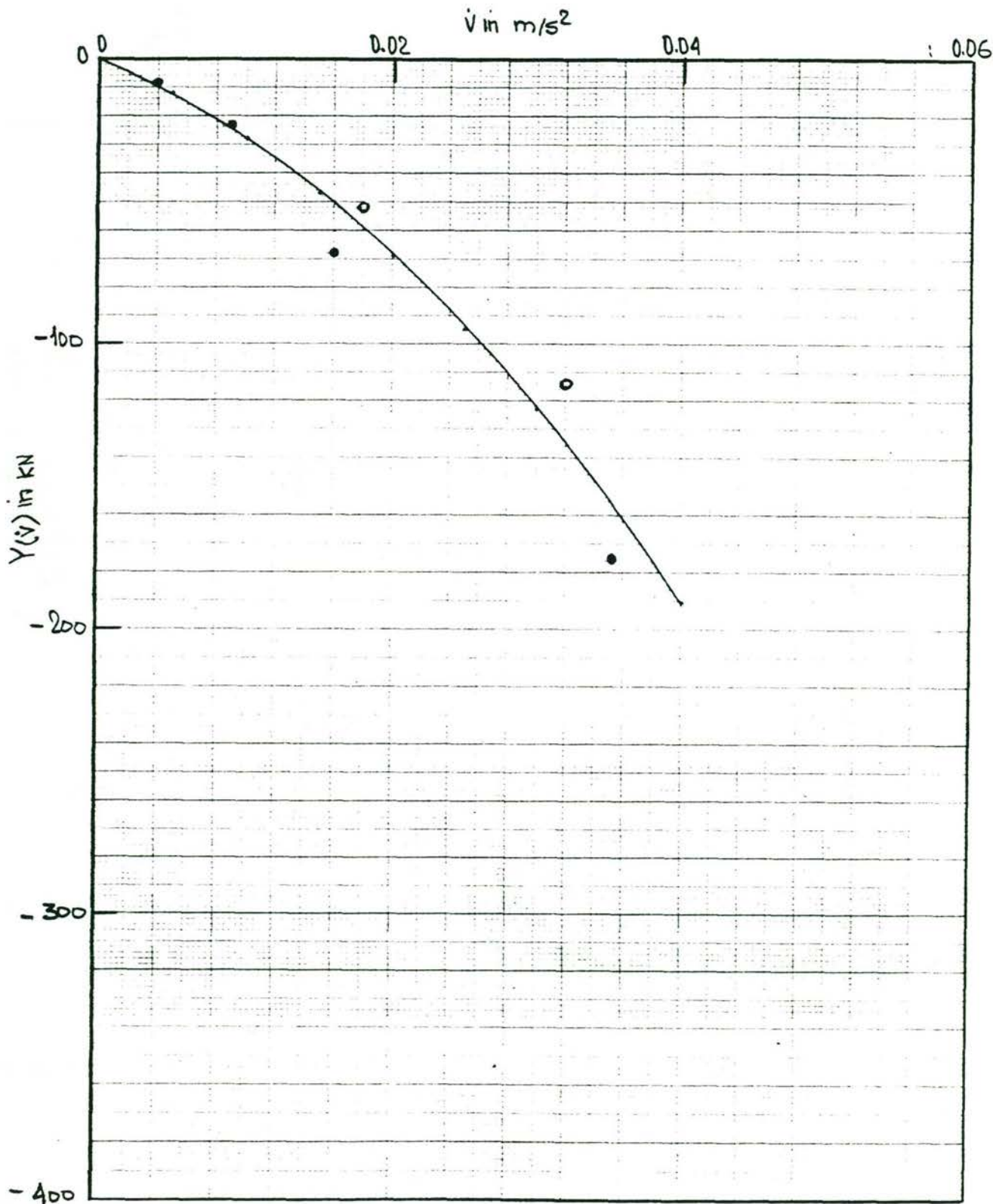
snelheid : U= 3.00 m/s
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○
 Δ vgl. met statische proeven



DVK Projekt Windhinder
rijn-herne: beladen, breed water

VERZET OSCILLATIE PROEVEN

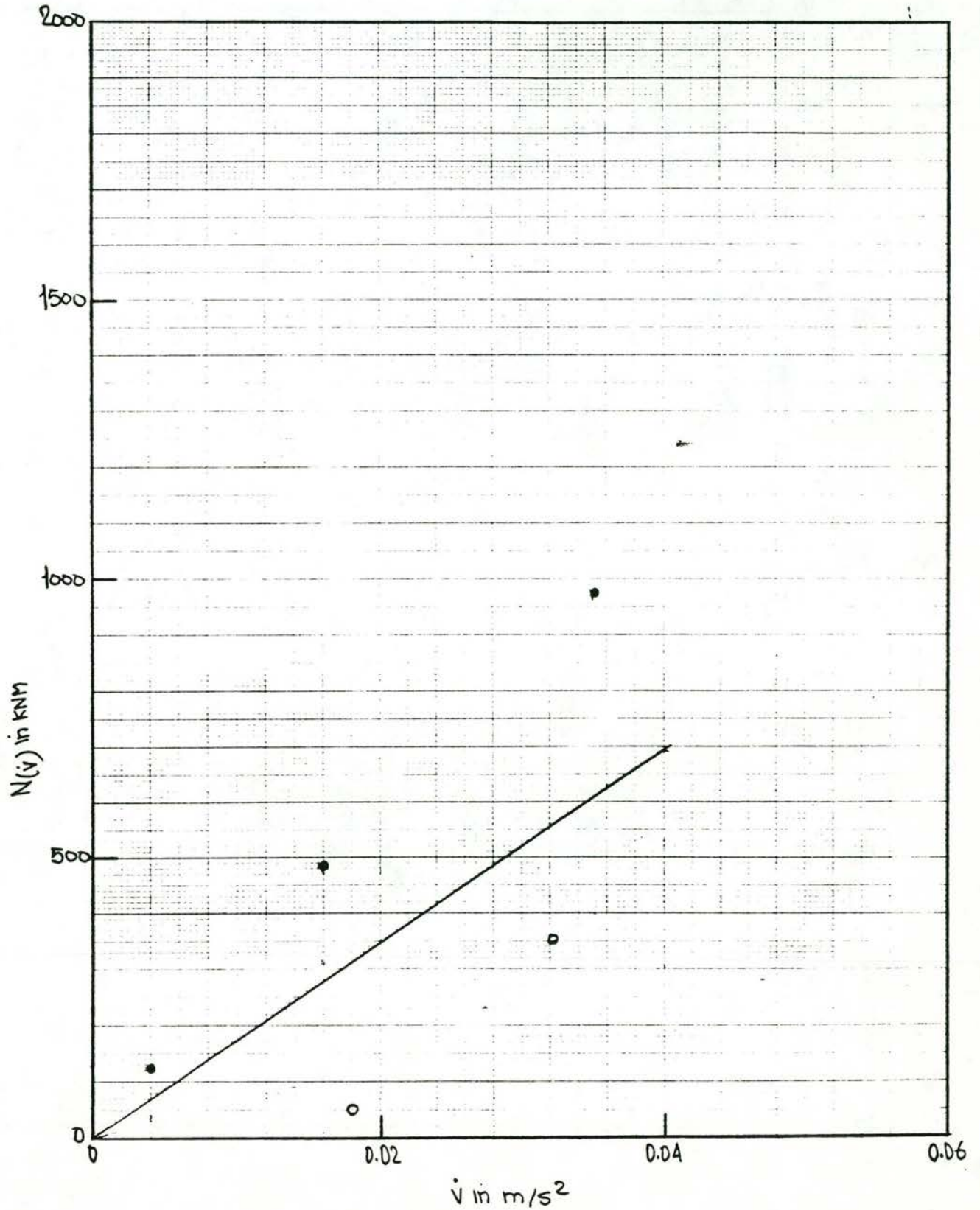
snelheid : U= 3.00 m/s
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

VERZET OSCILLATIE PROEVEN

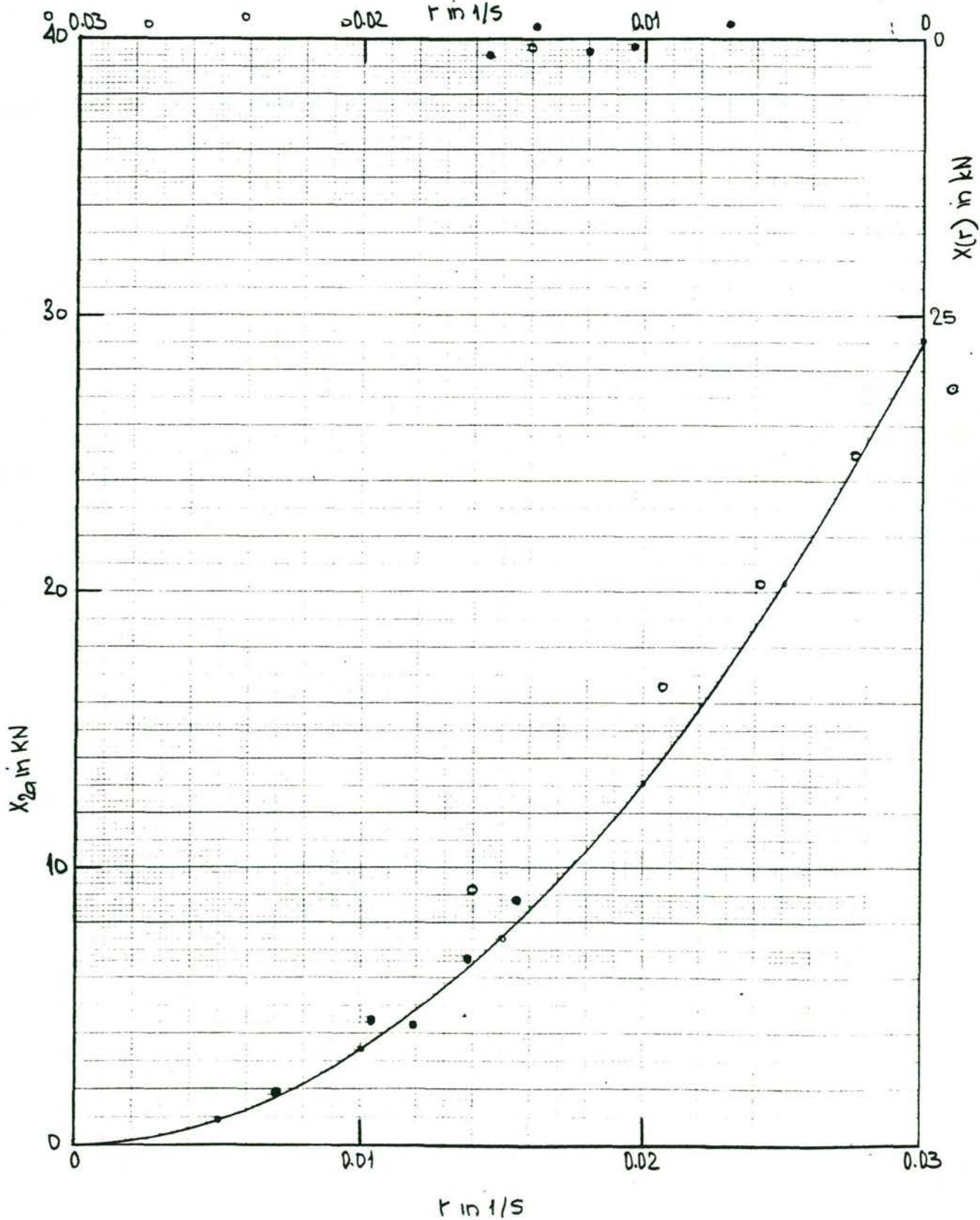
snelheid : U= 3.00 m/s
amplitude 2.50 meter : ●
amplitude 5.00 meter : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

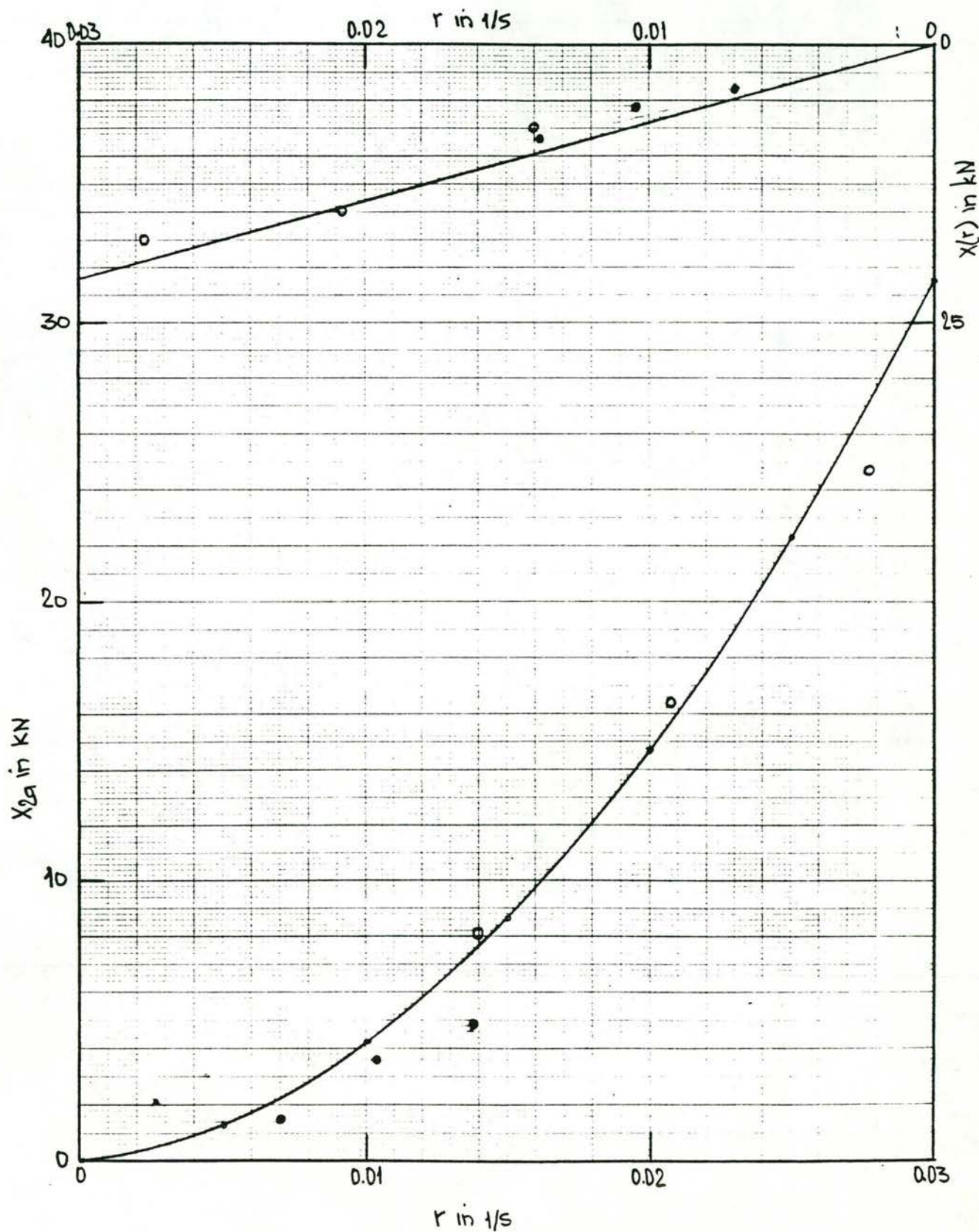
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

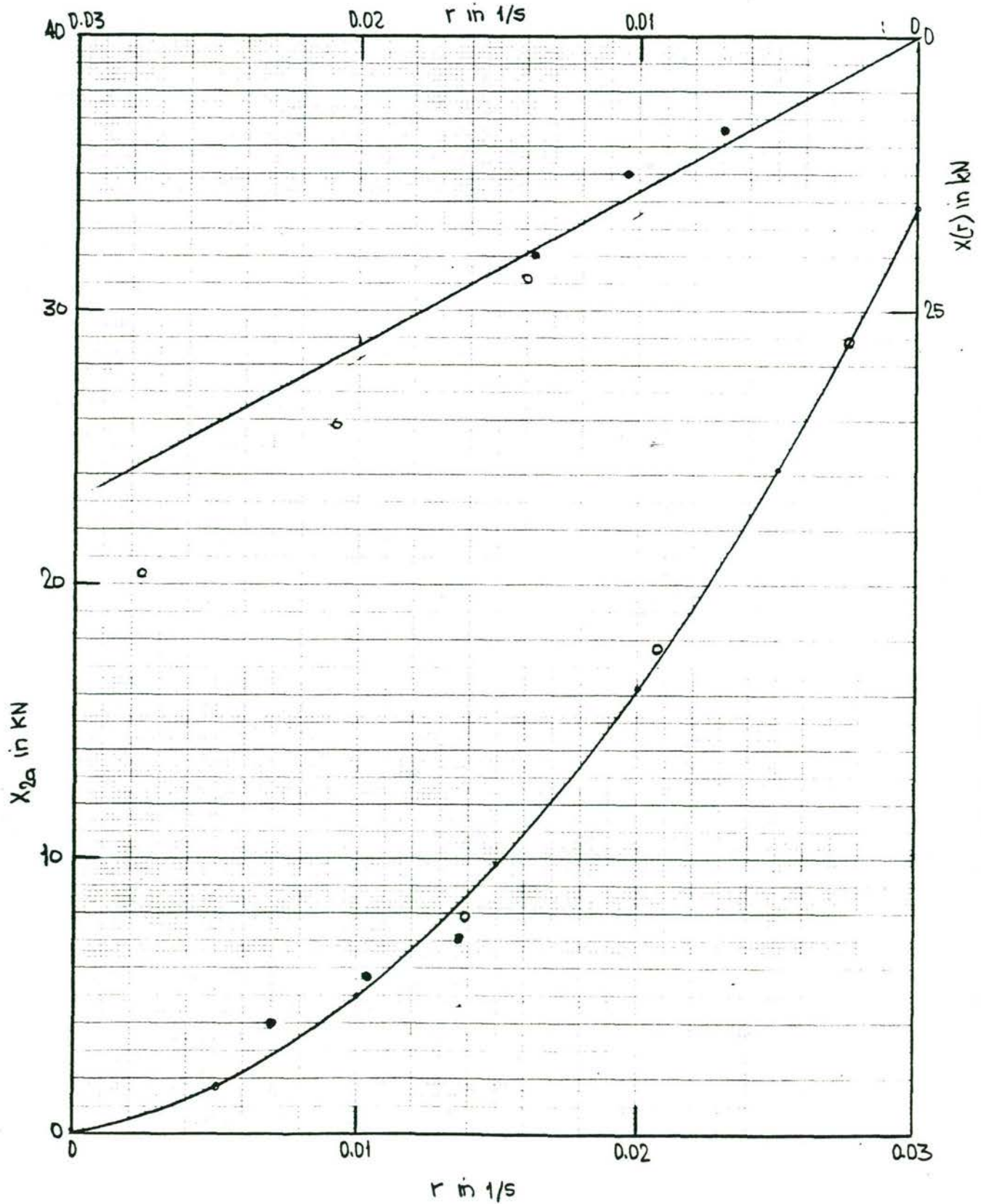
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

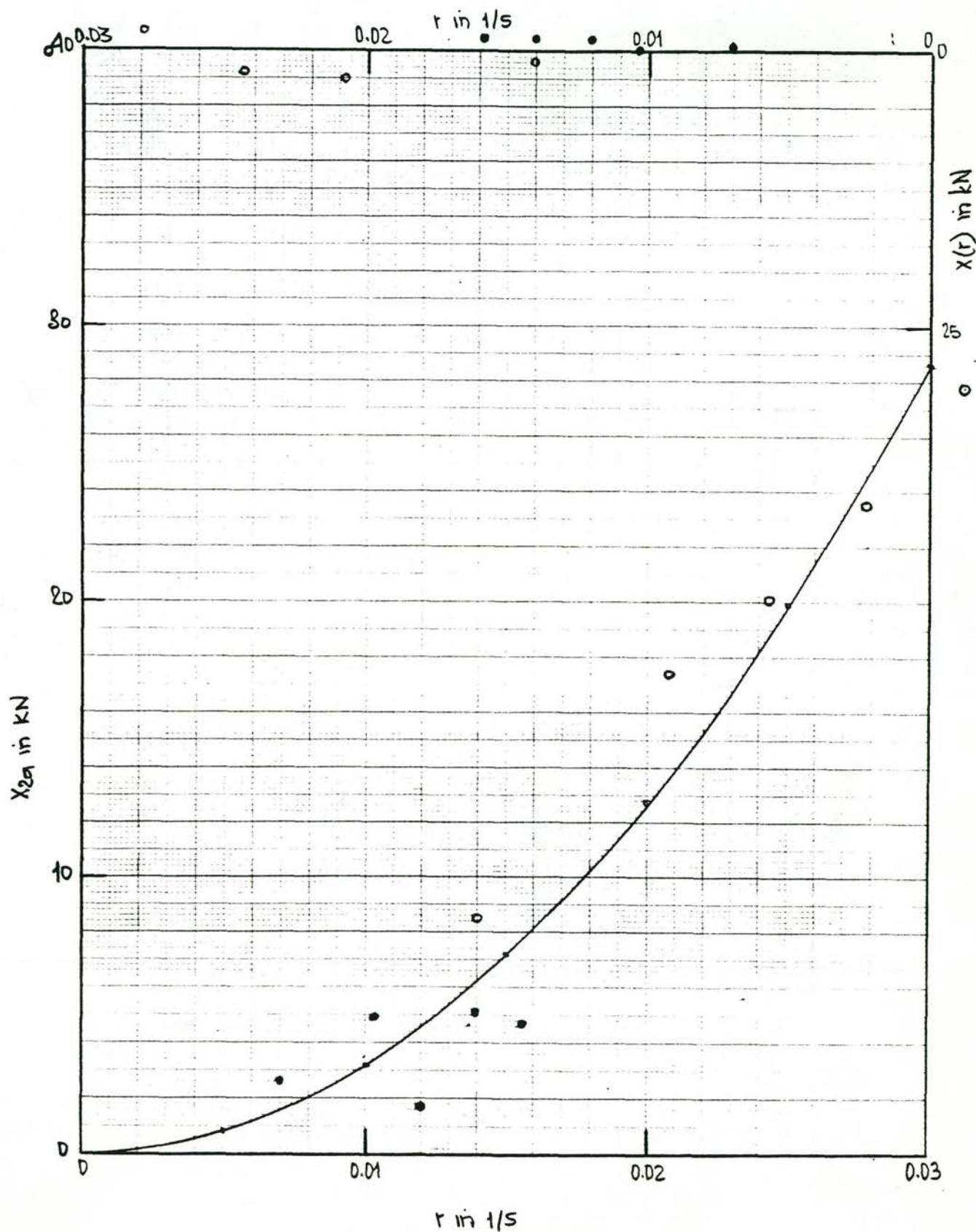
drifthoek : $B = 16$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

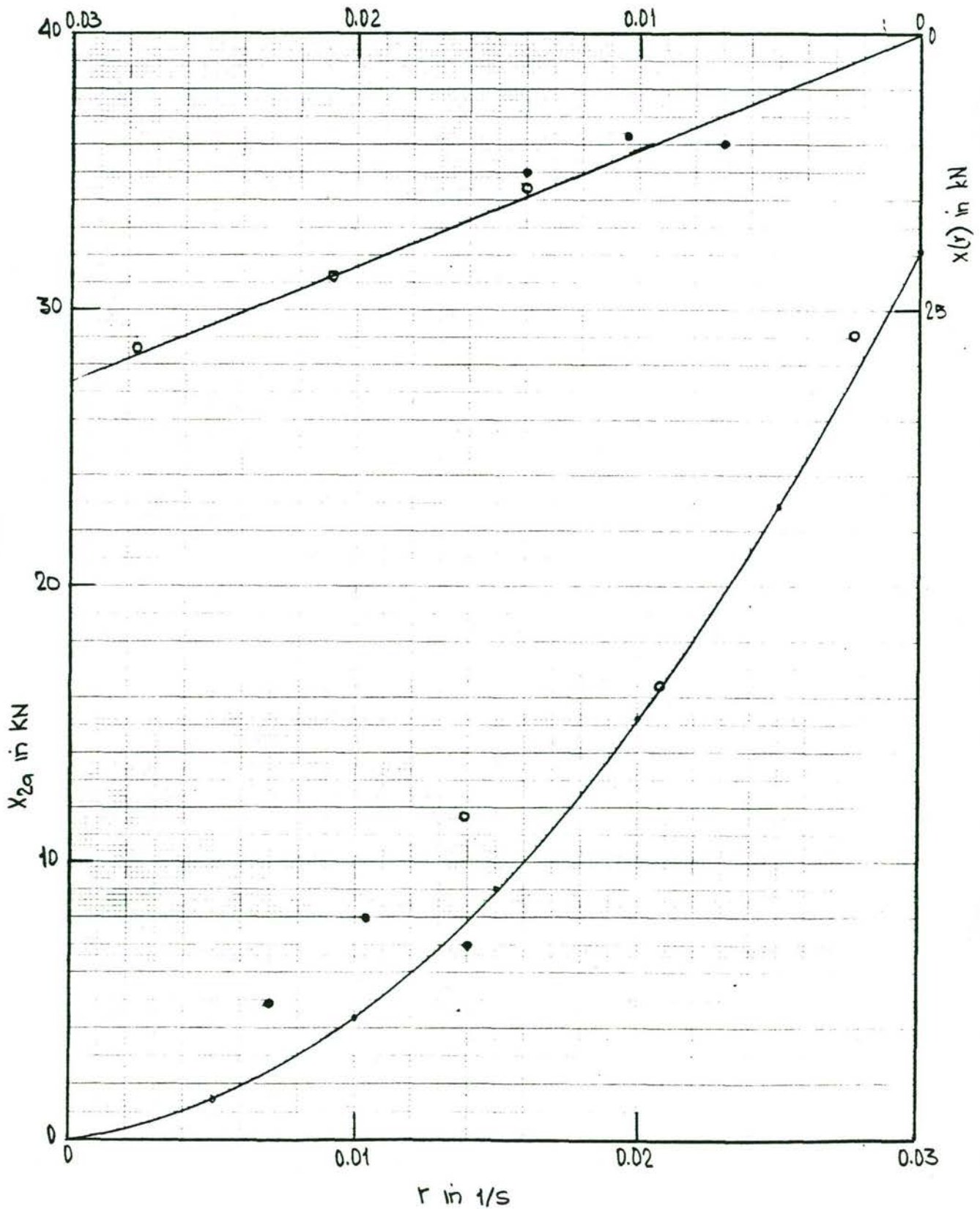
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

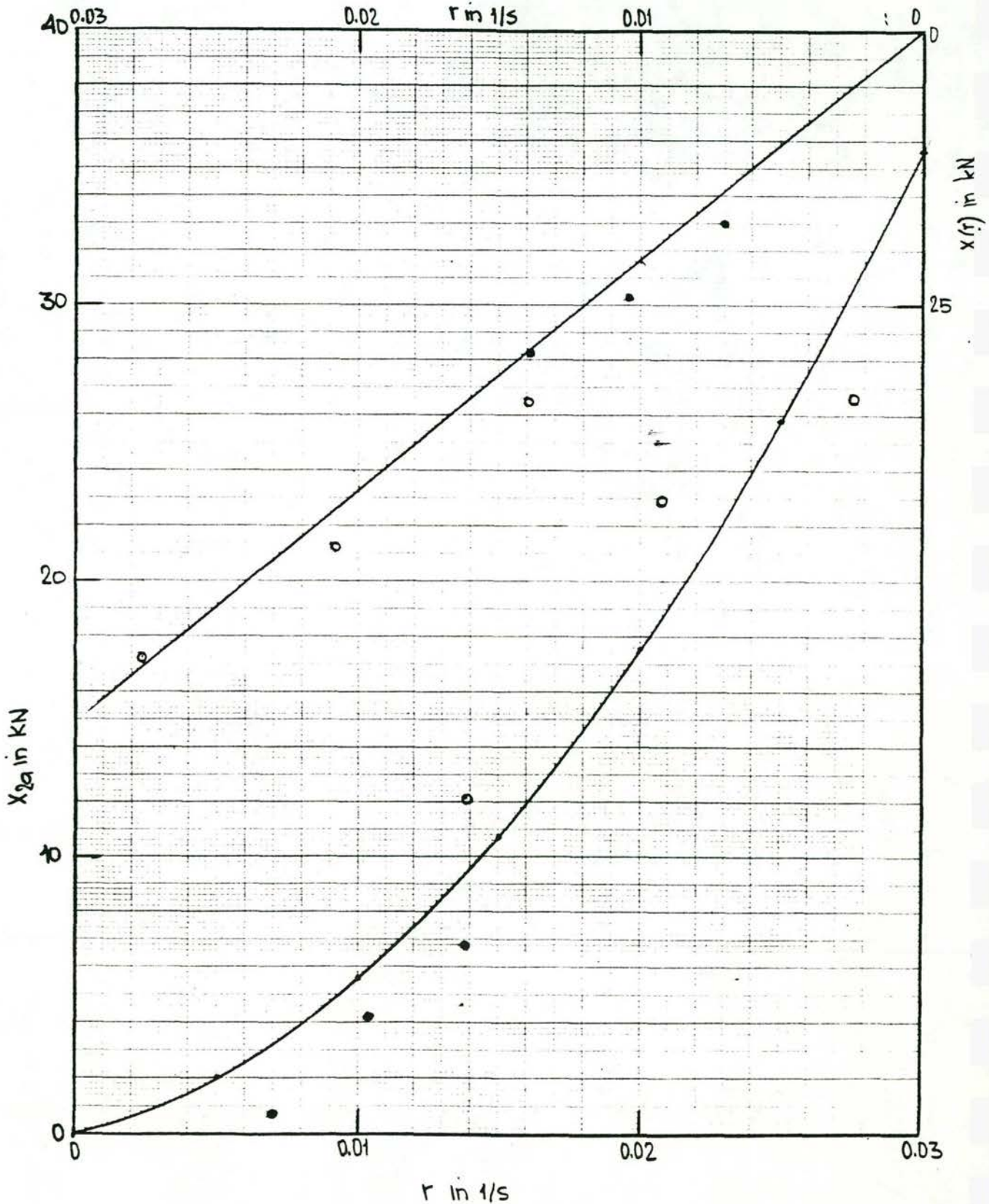
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

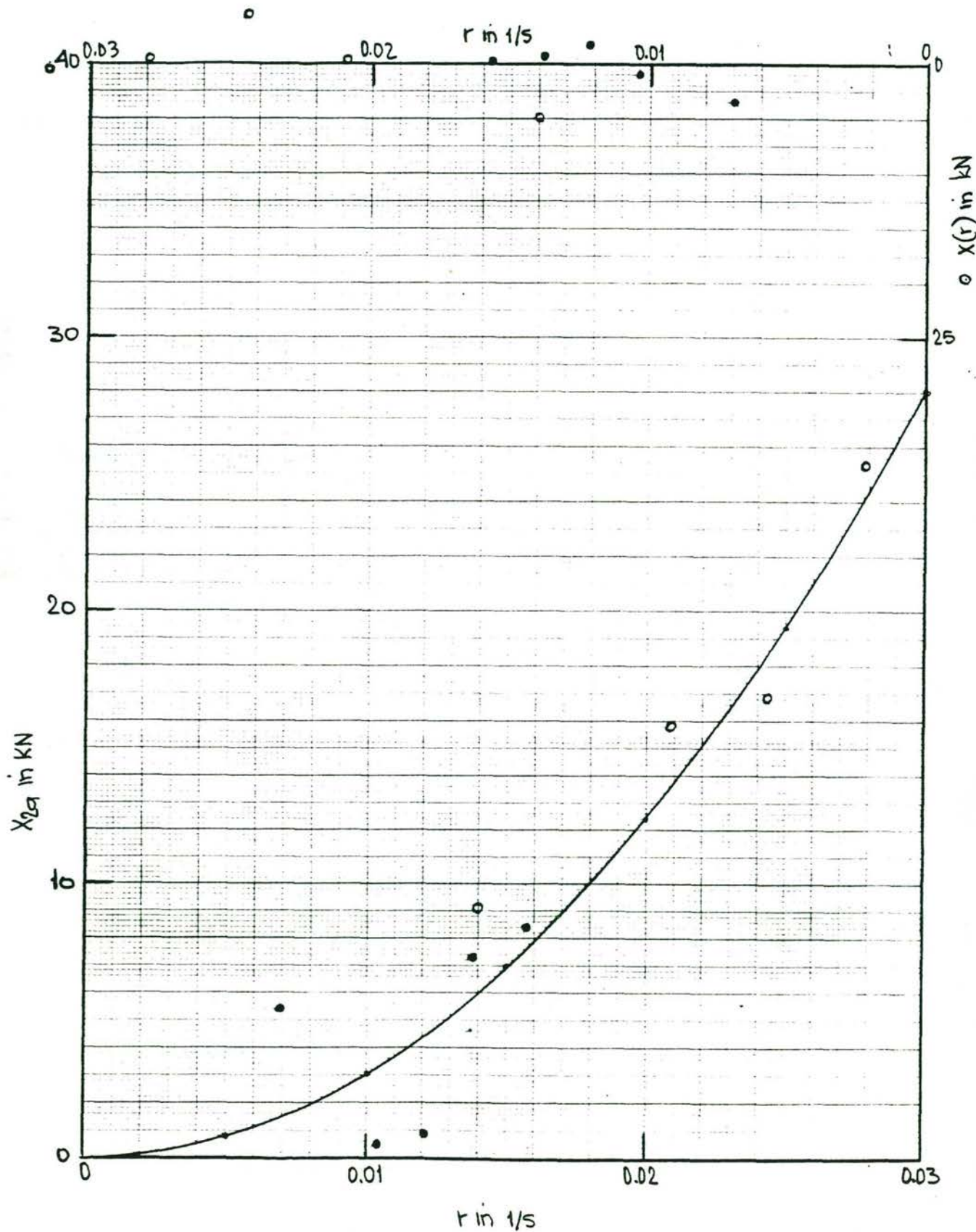
drifthoek : $B = 16$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

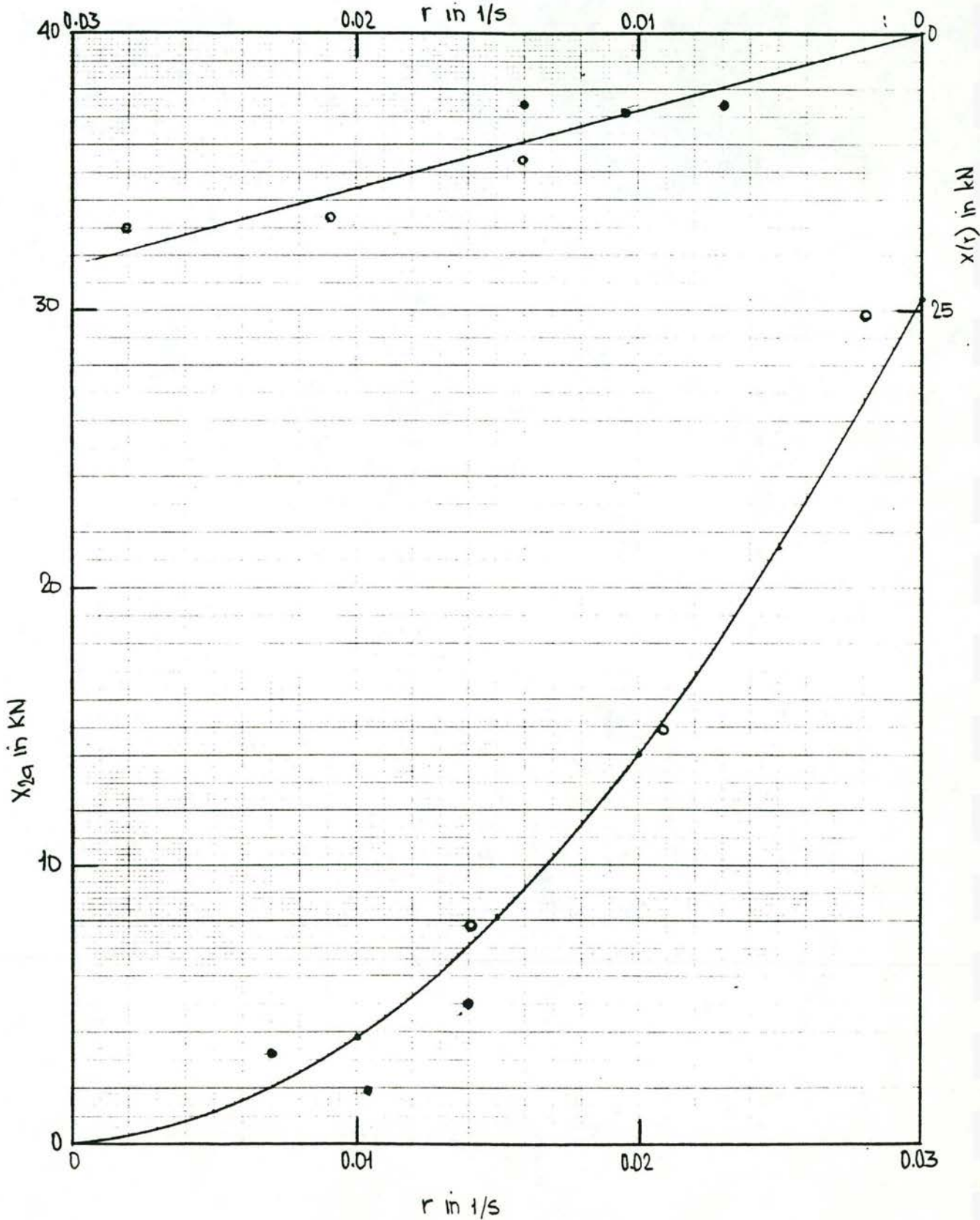
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

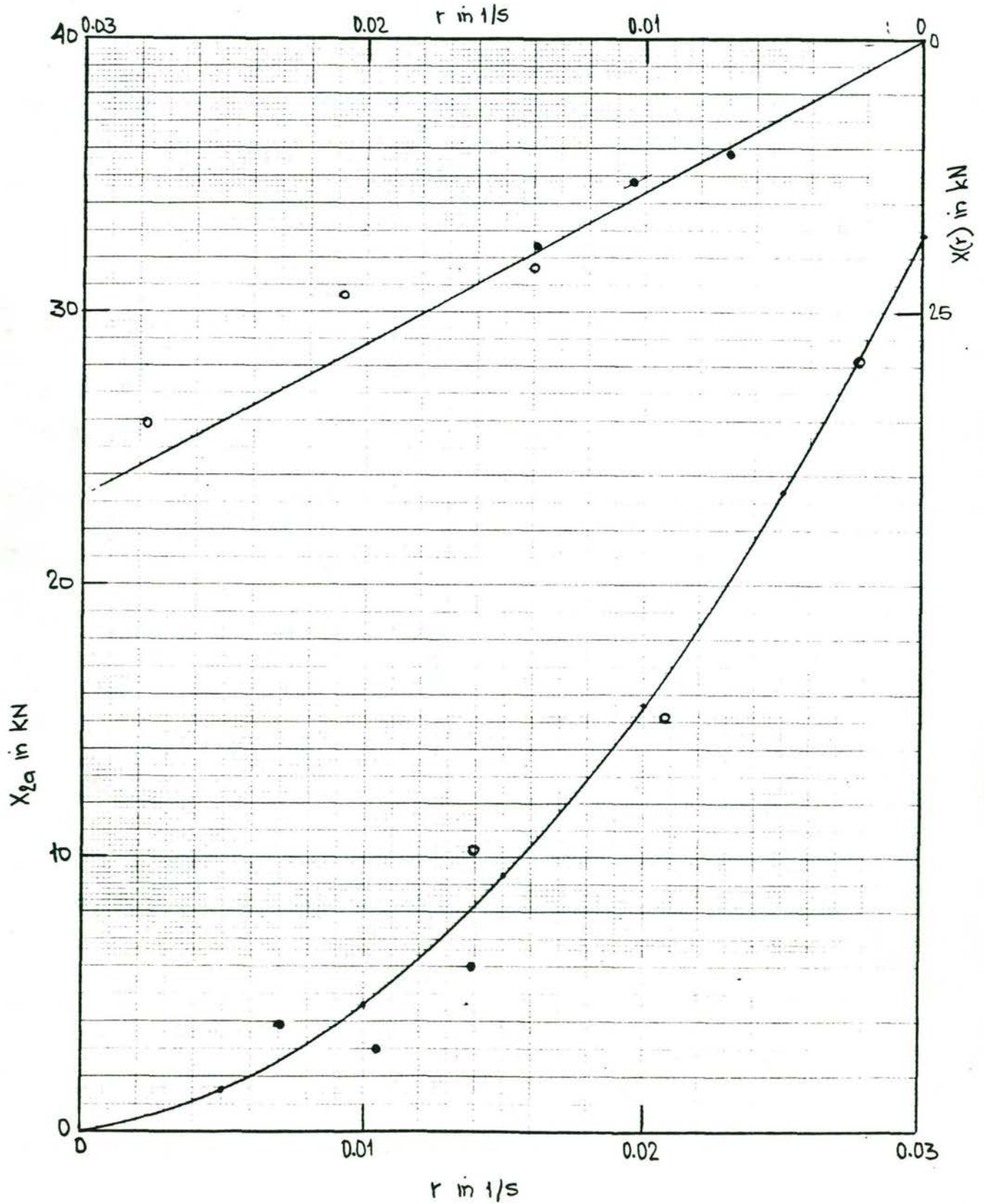
drifthoek : B= 4 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

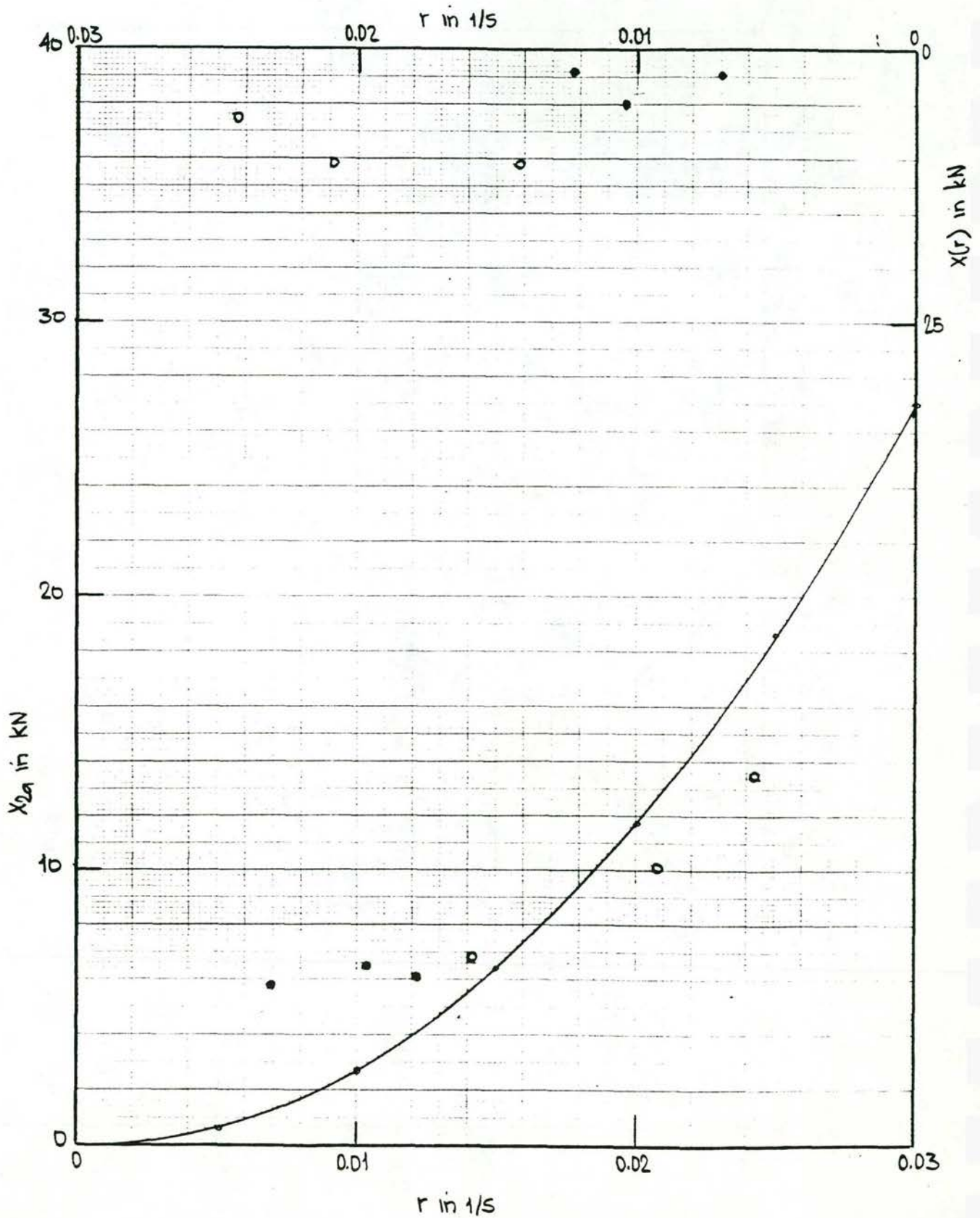
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 425 m/s)

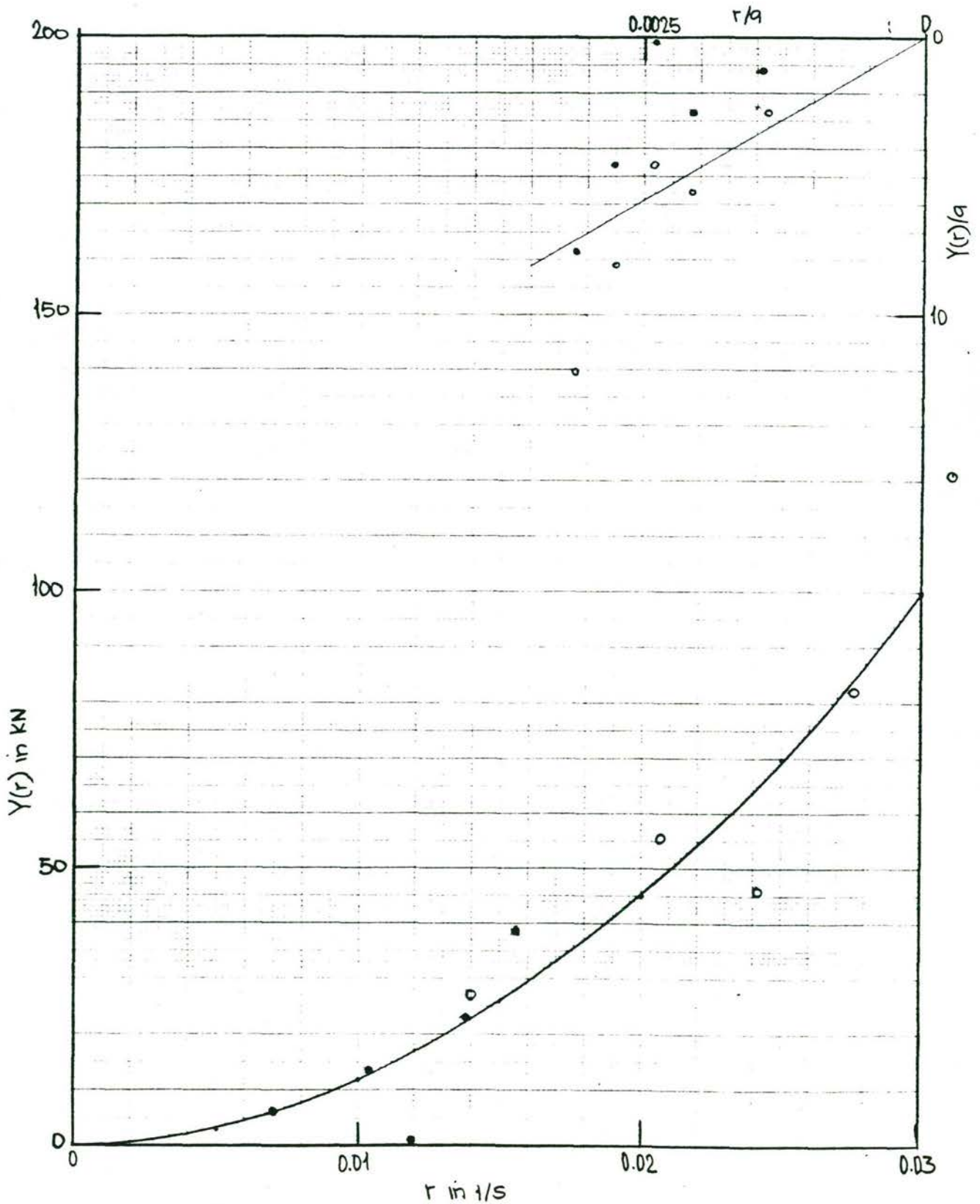
drifthoek : $B = 0$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

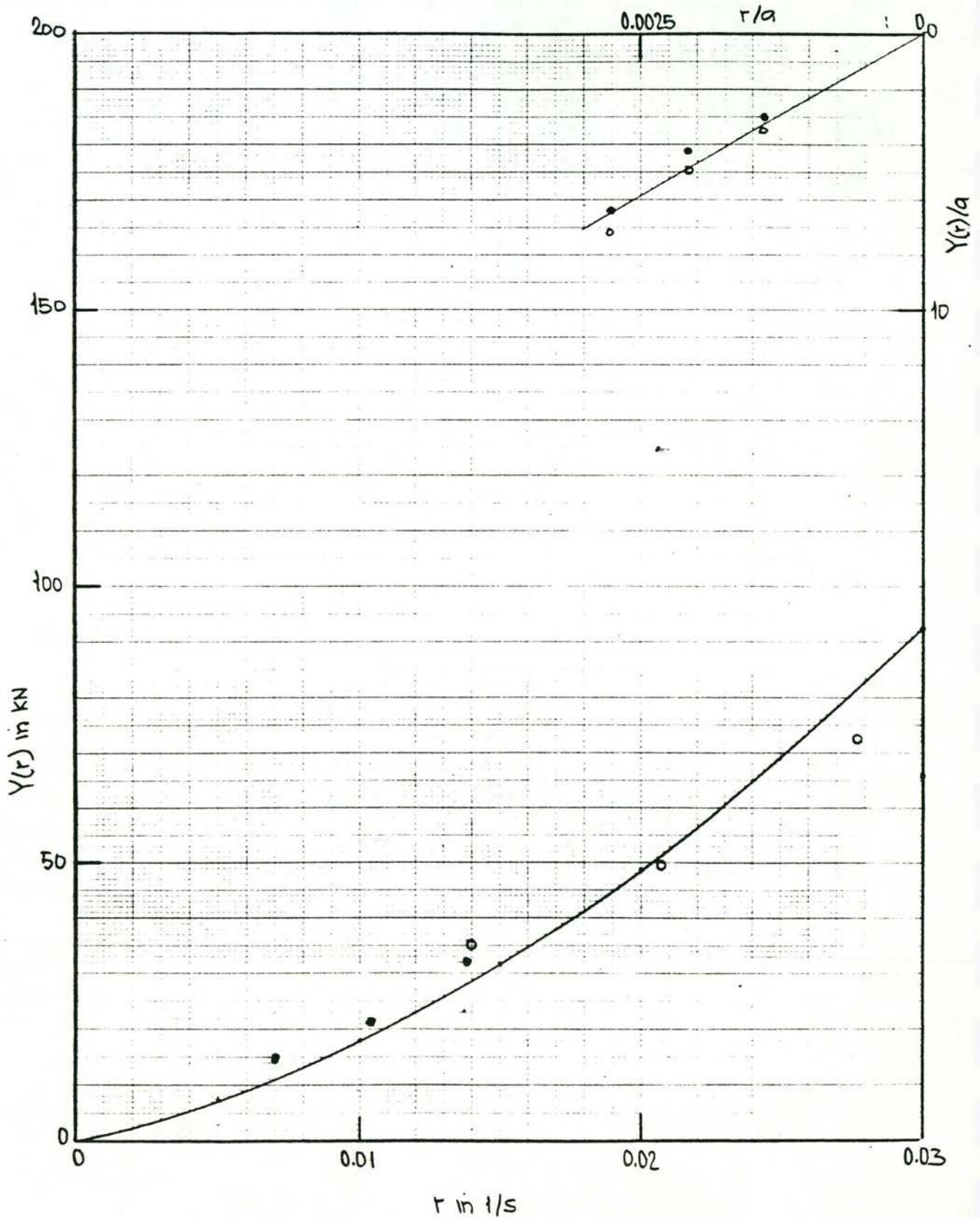
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 150 m/s)

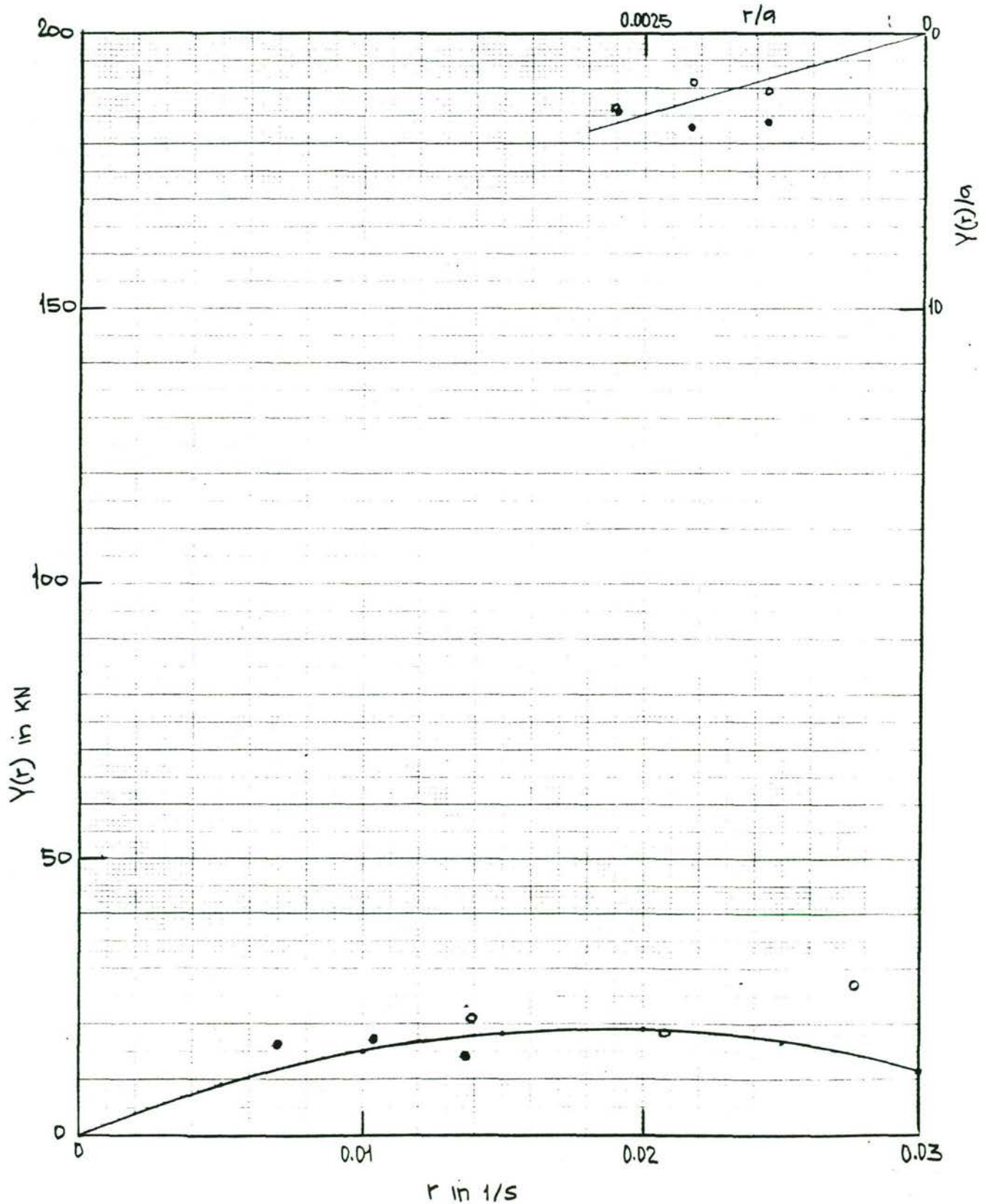
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

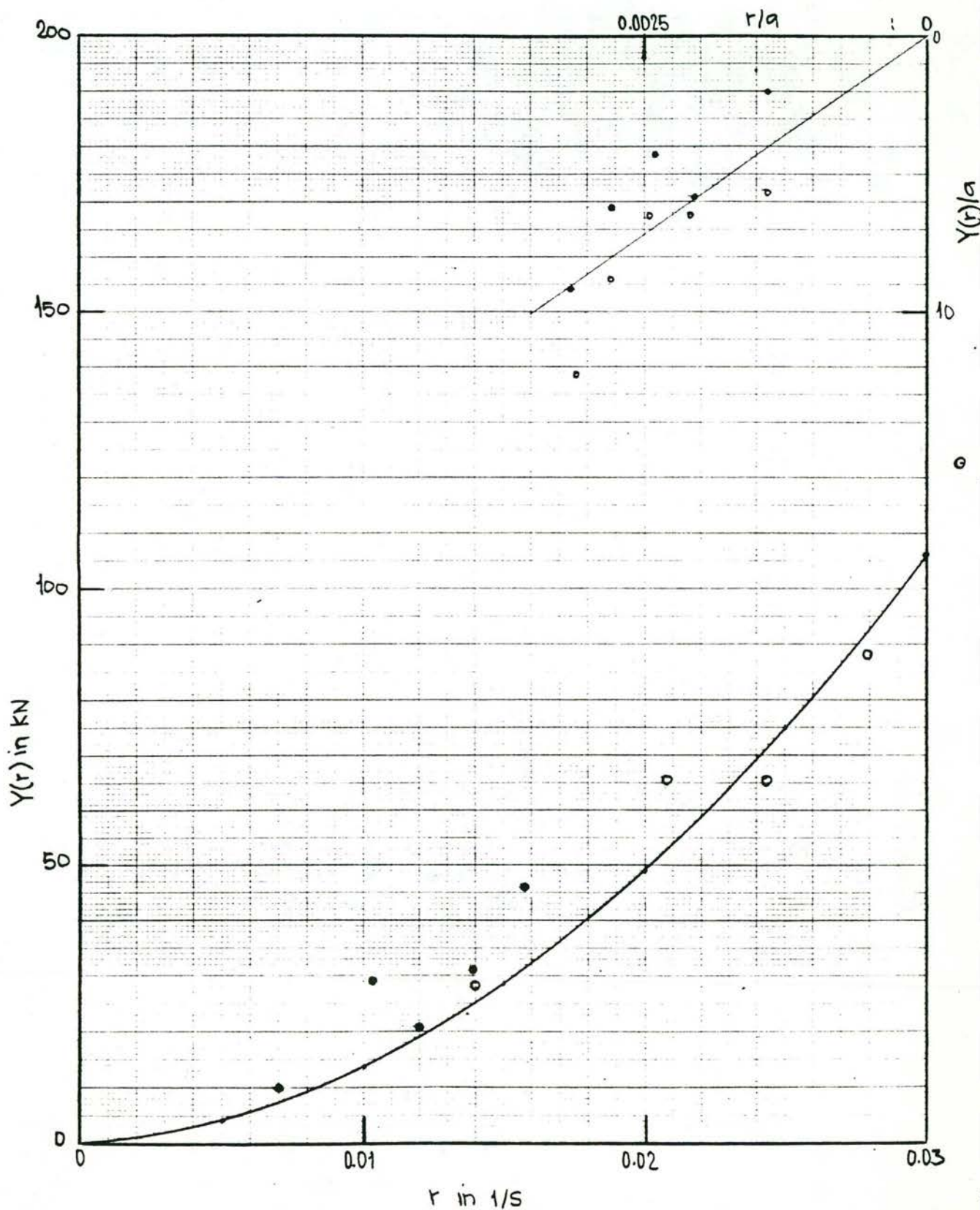
 drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

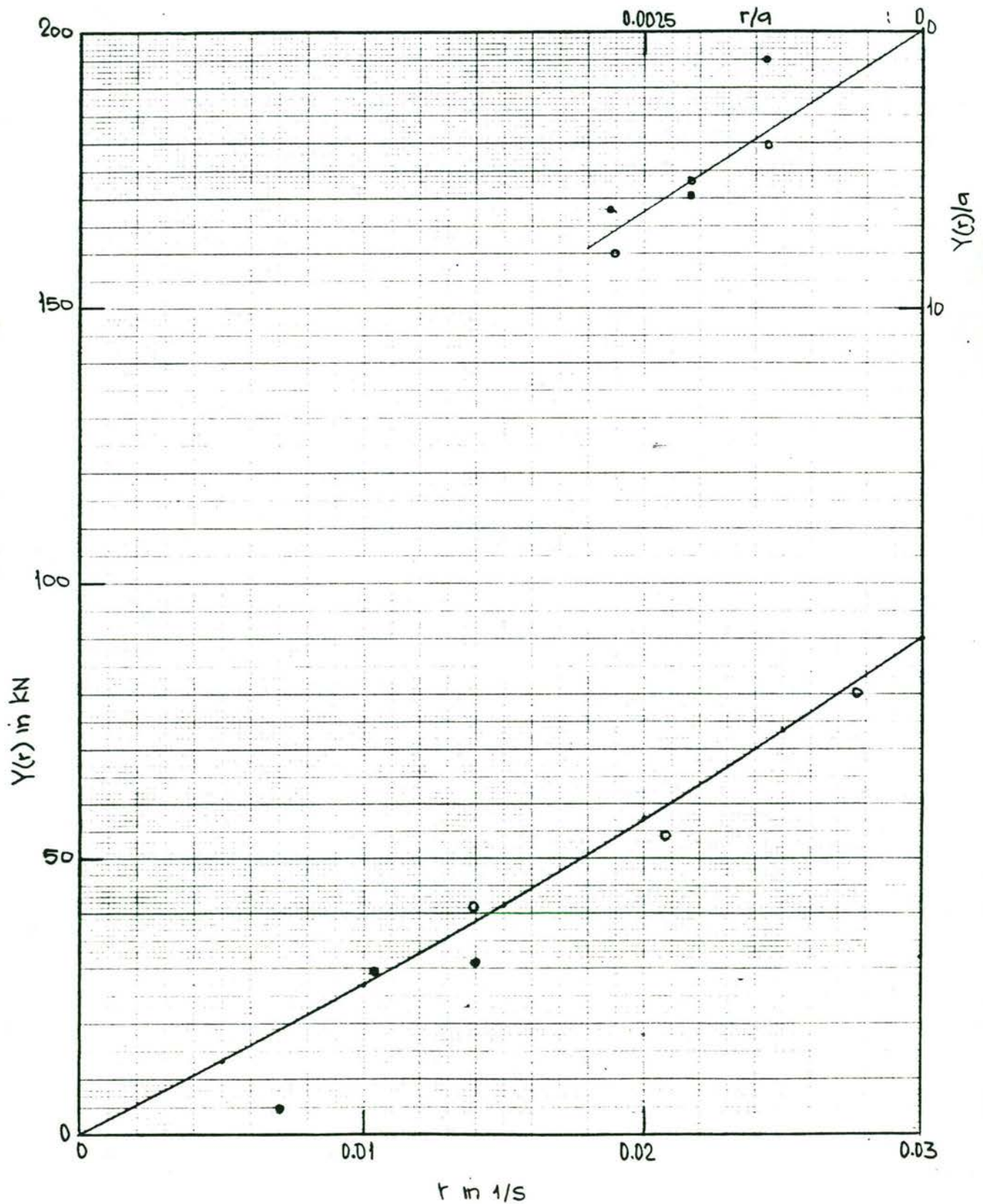
drifthoek : $B = 0$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

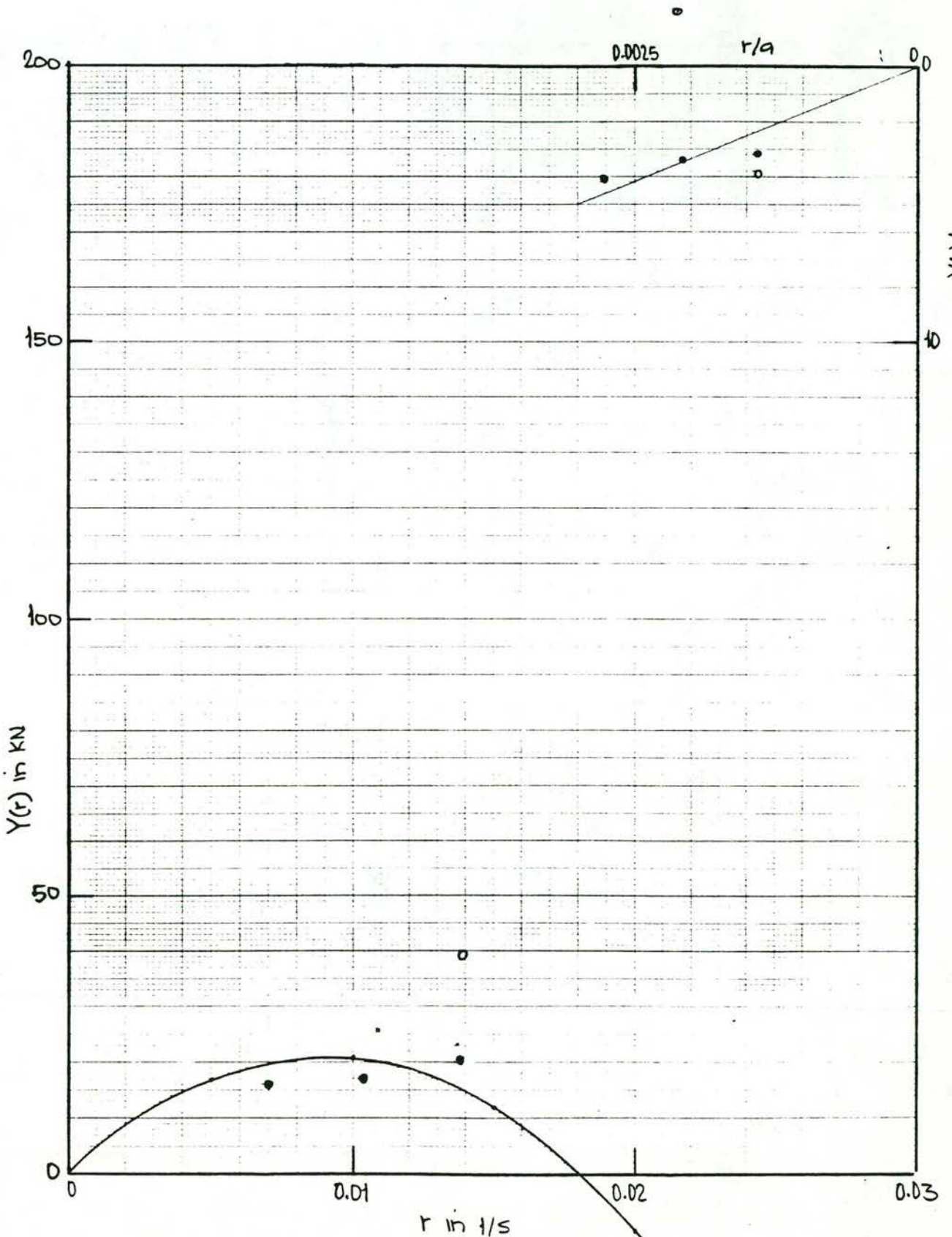
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : \bullet
 amplitude 10.0 graden : \circ



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

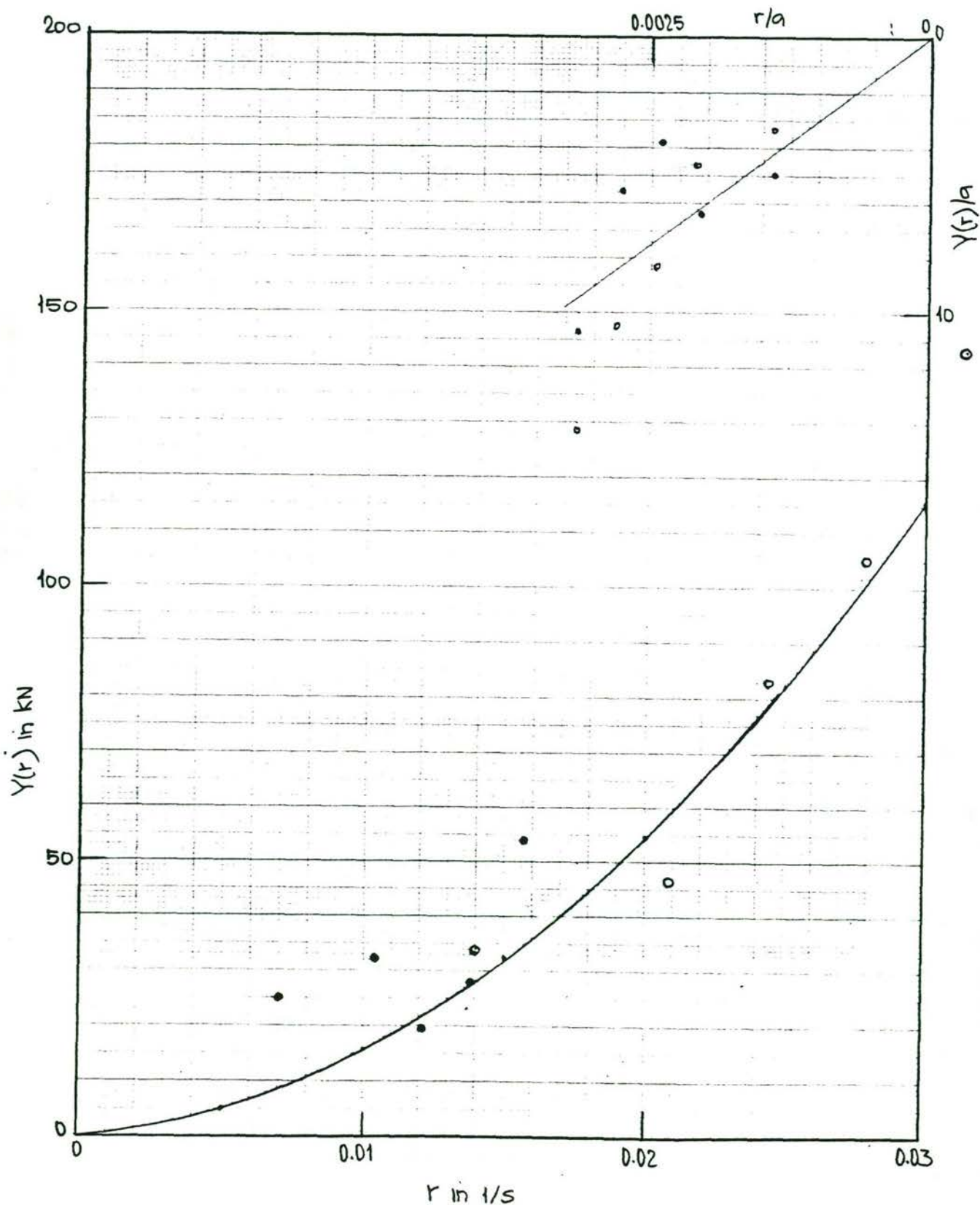
drifthoek : B= 16 dego
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

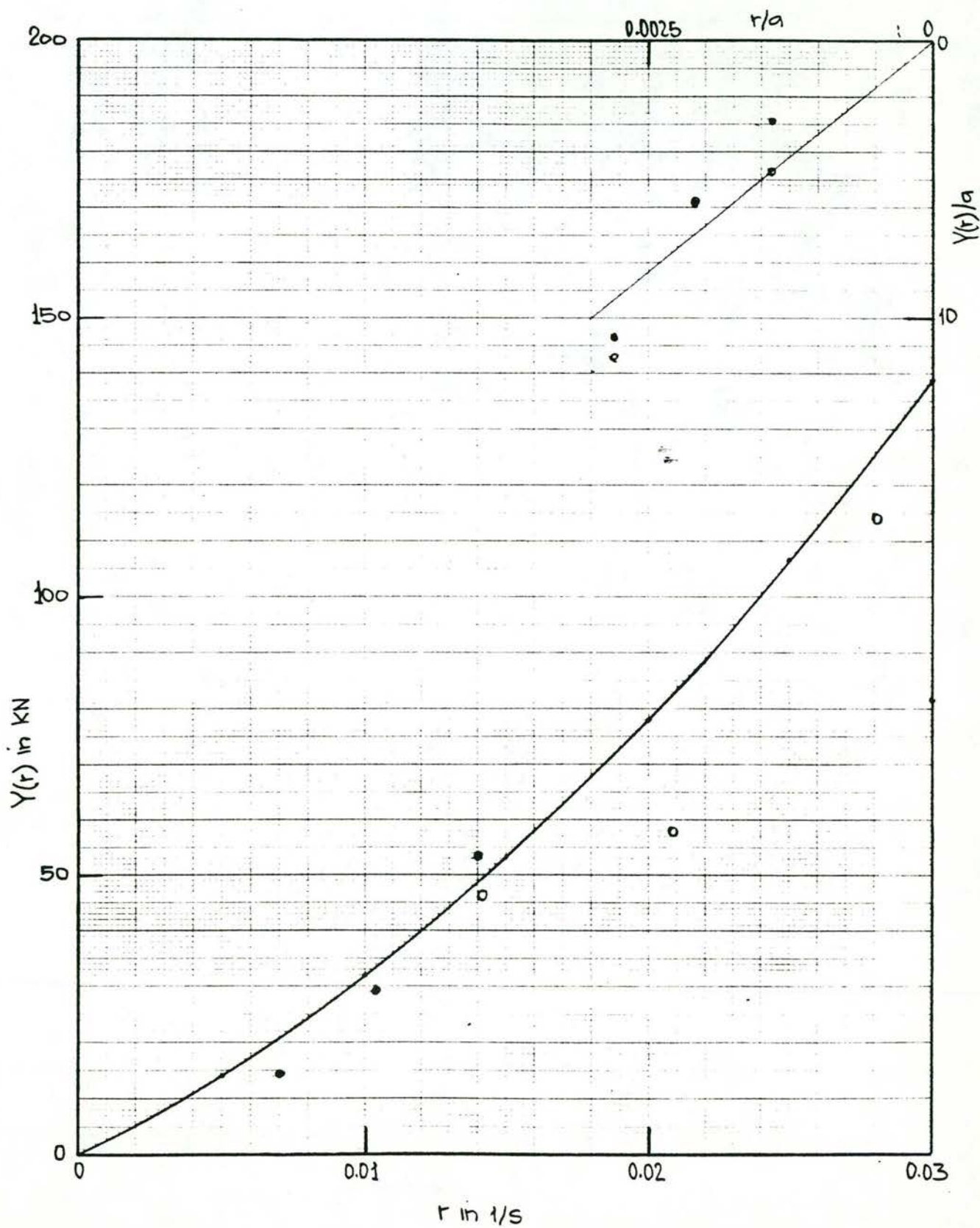
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

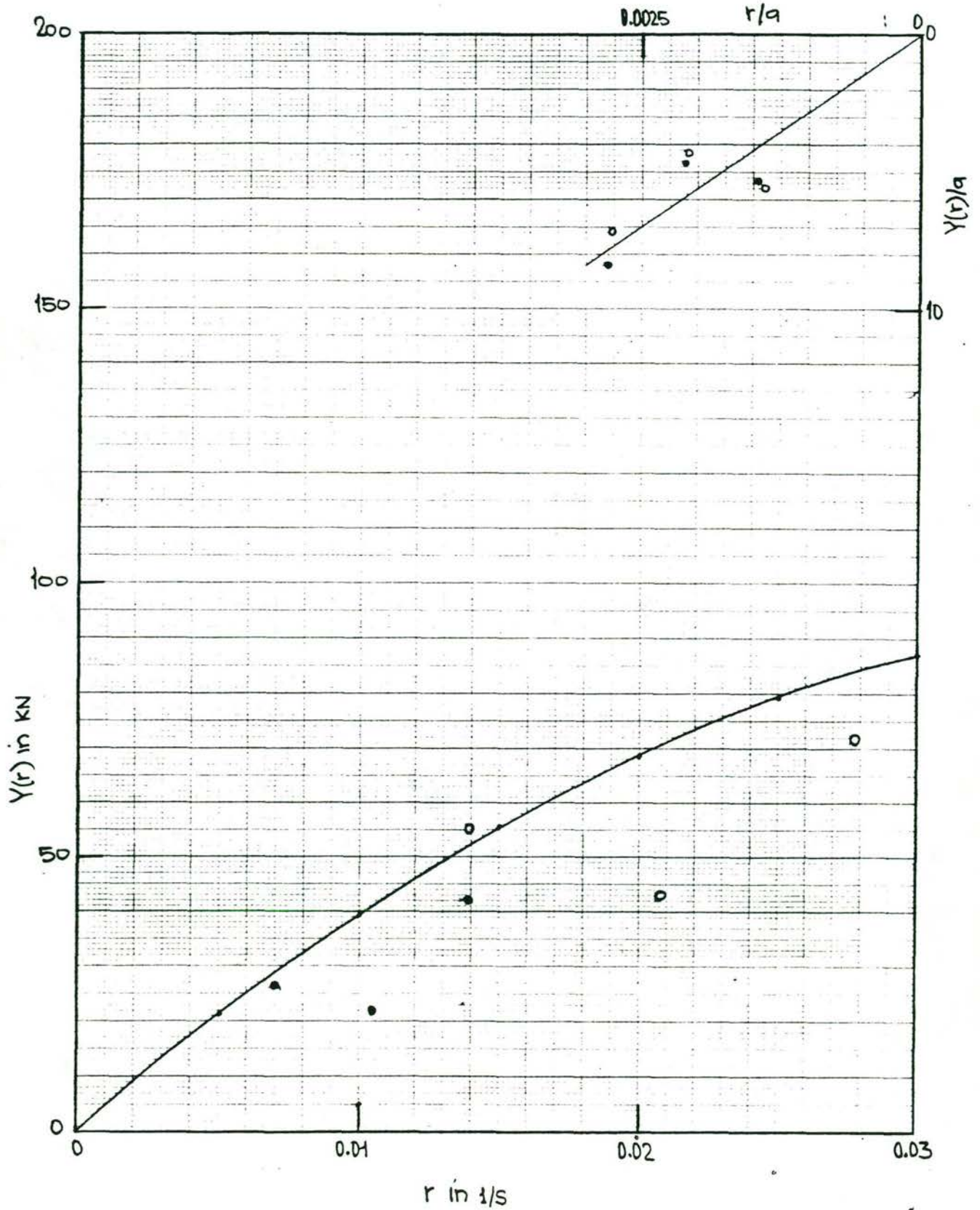
 drifthoek : B= 4 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 300 m/s)

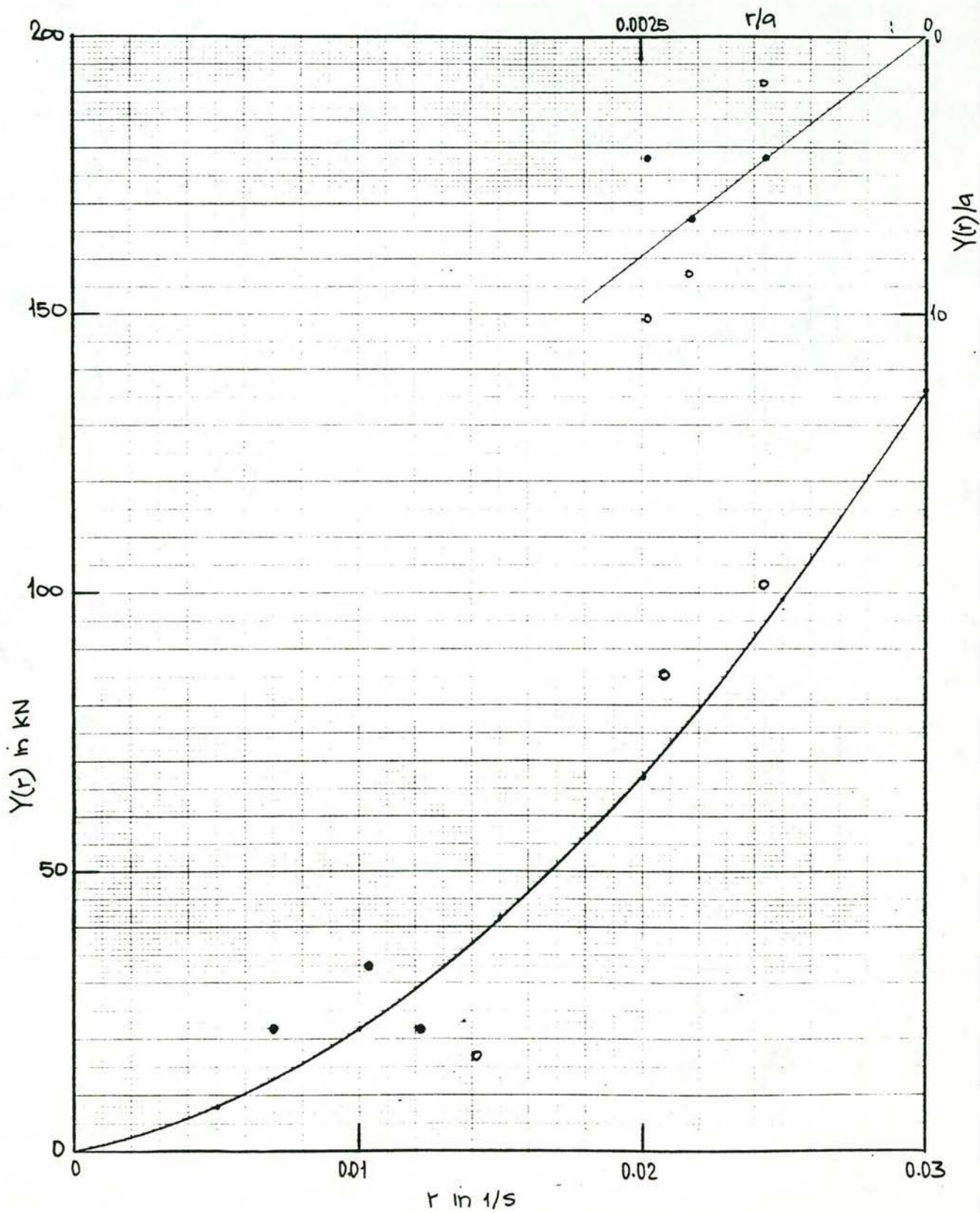
drifthoek : $\beta = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.25 m/s)

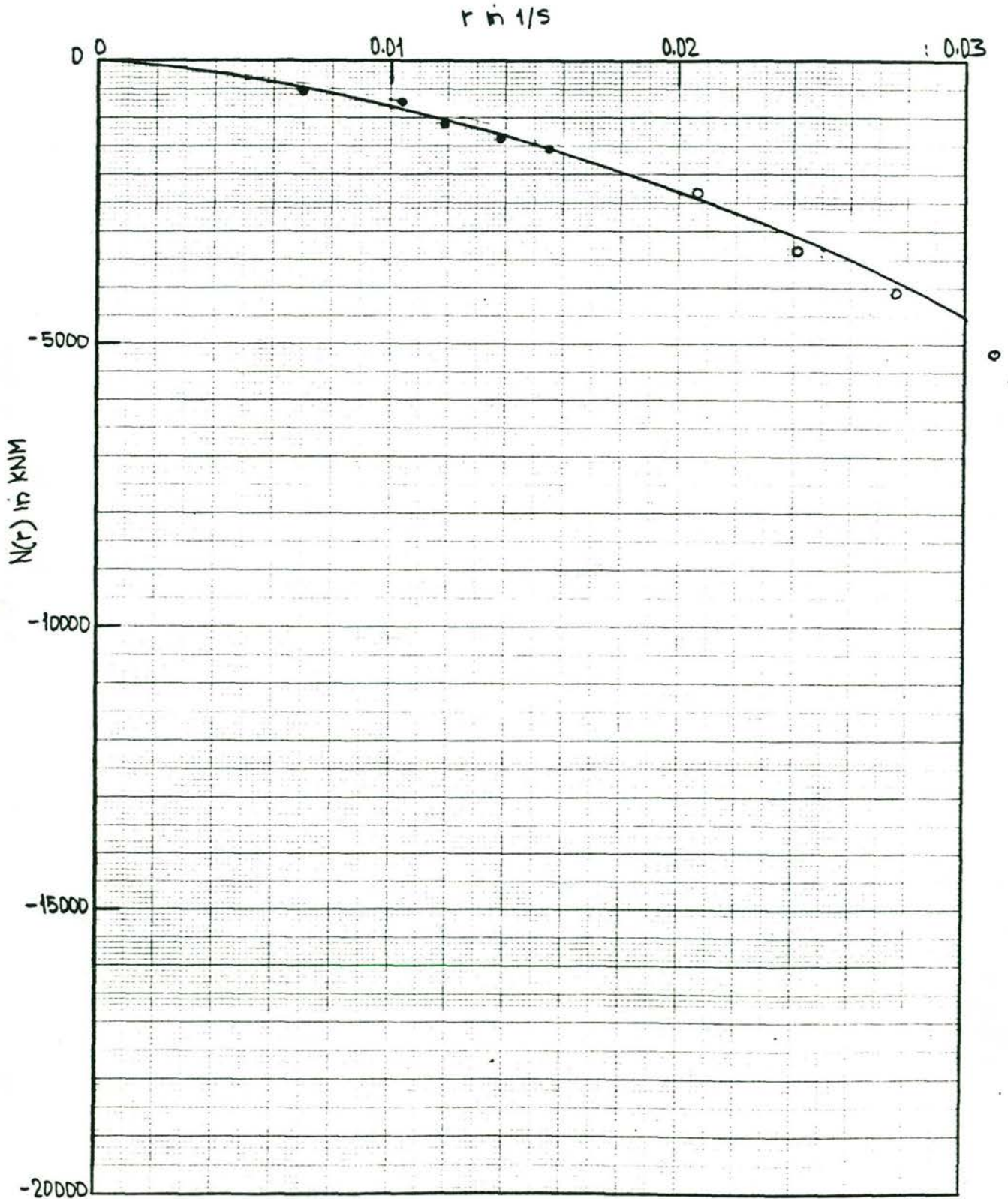
 drifthoek : B= ○ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 150 m/s)

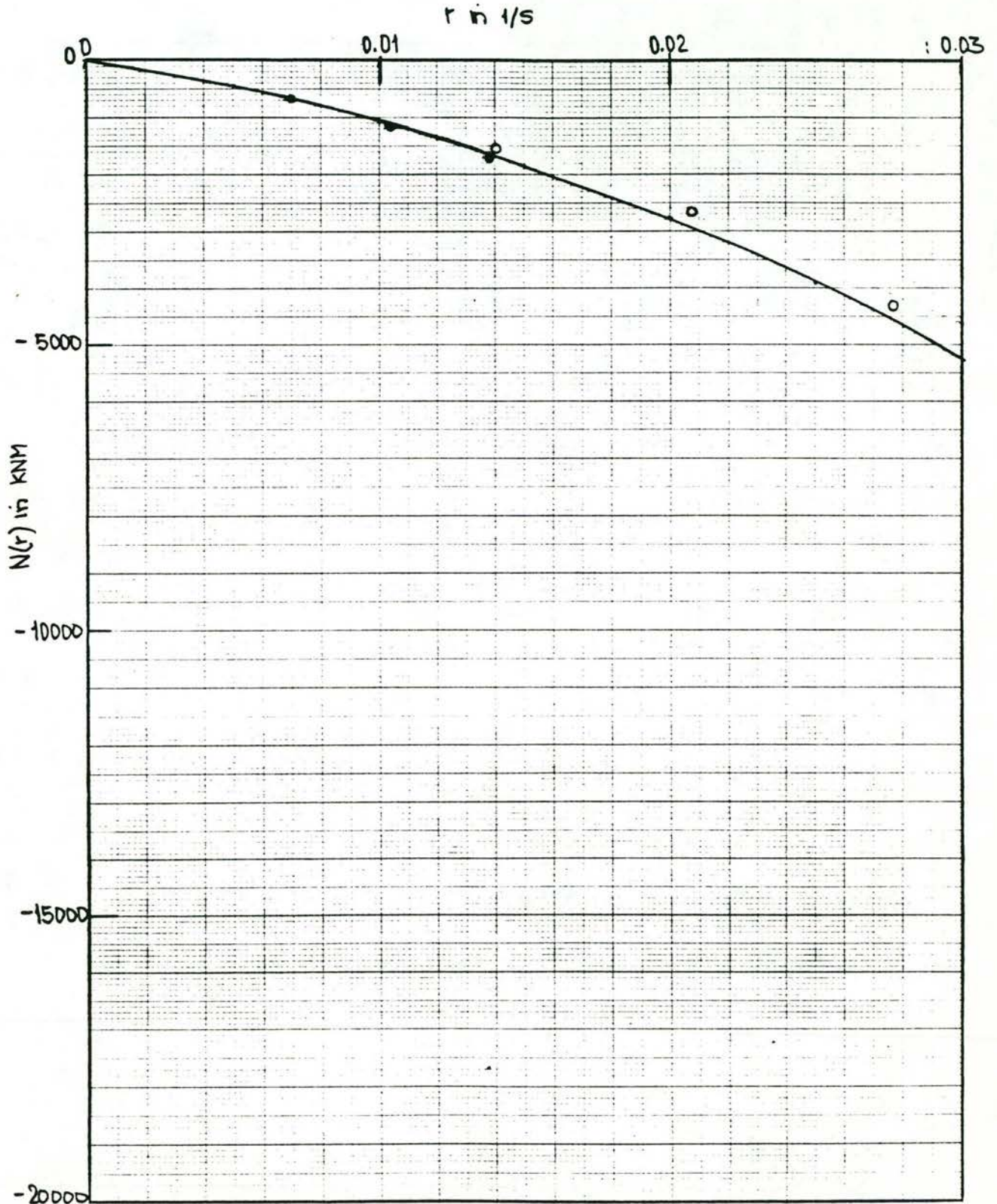
drifthoek : B= 0 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

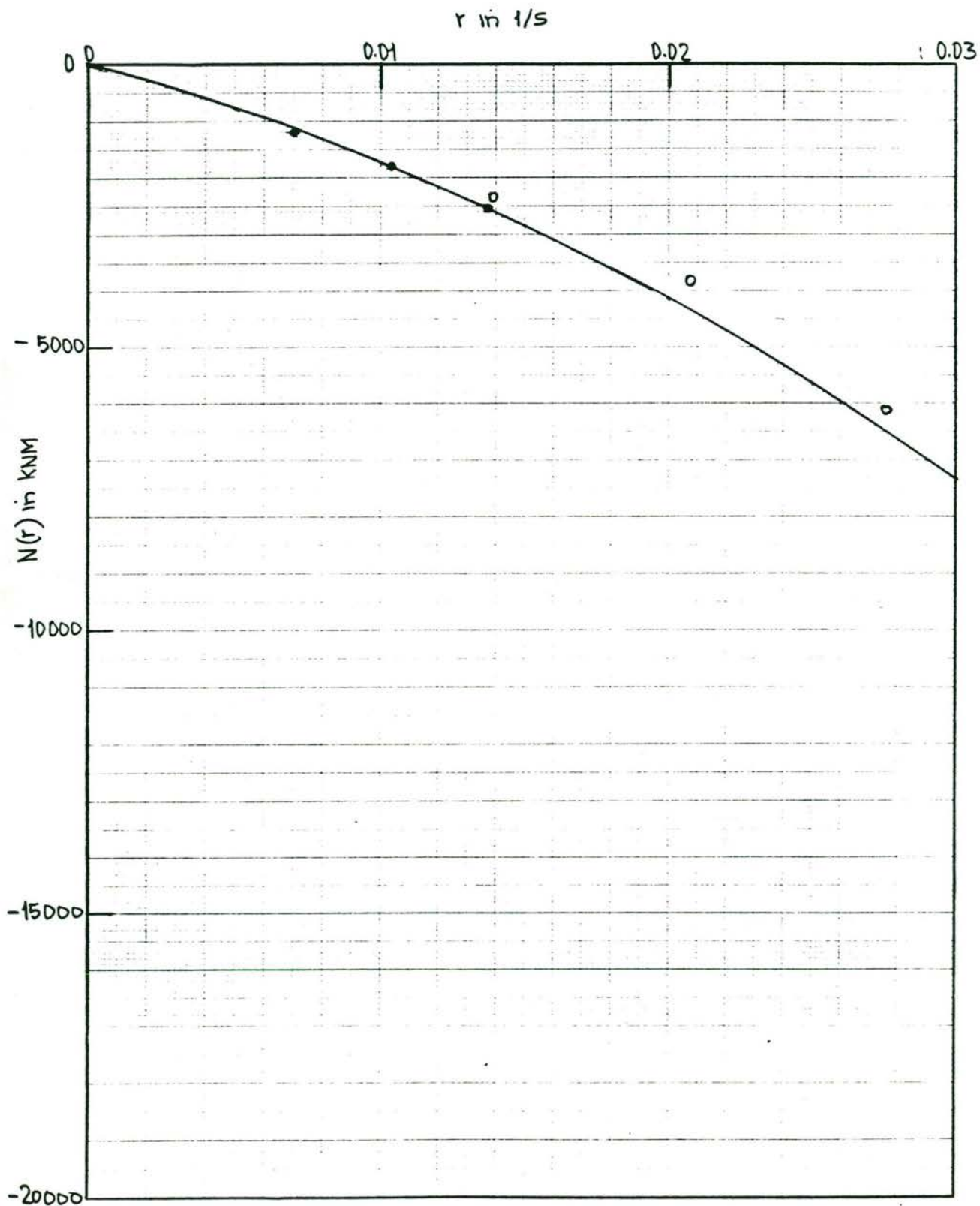
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

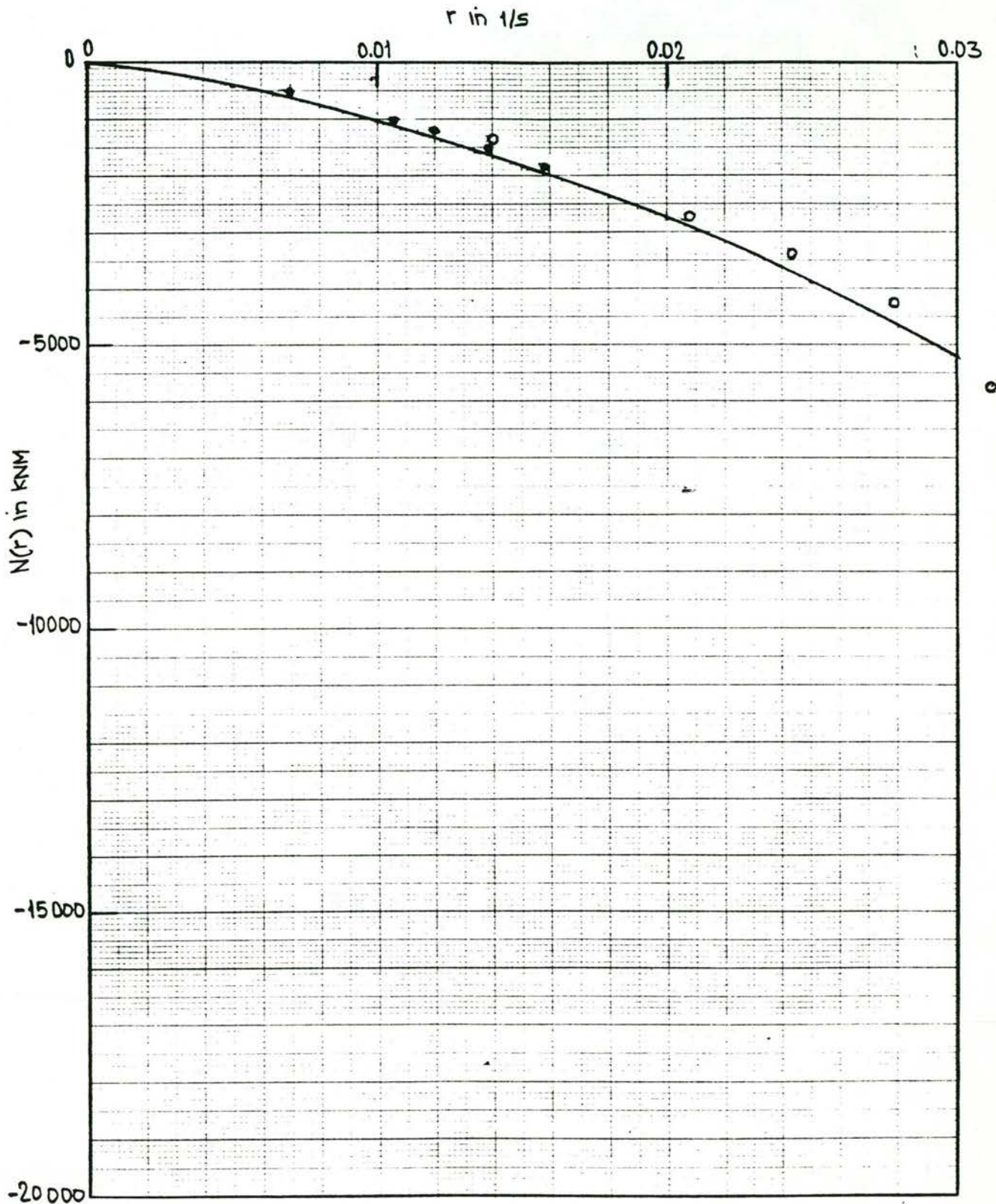
 drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

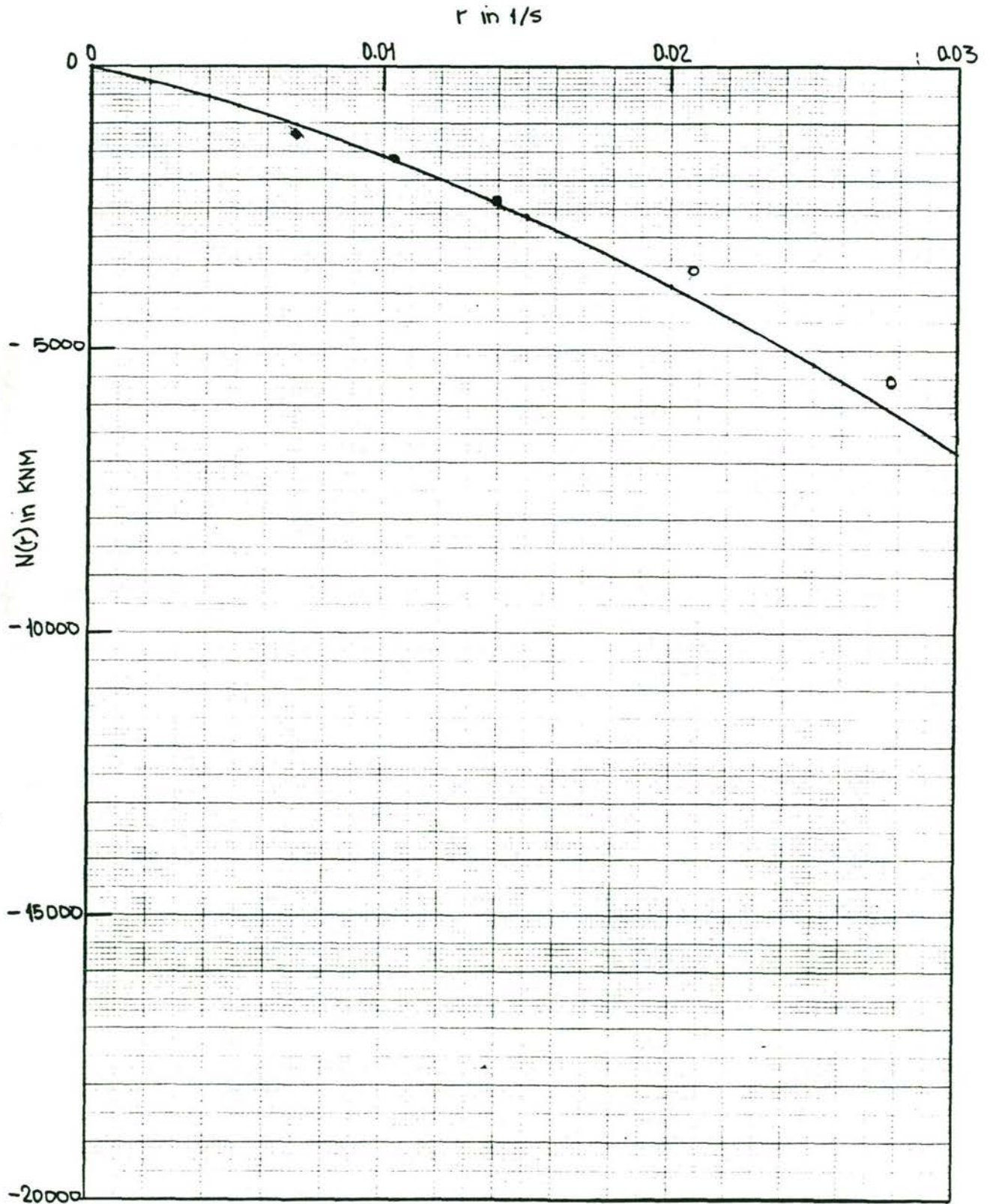
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

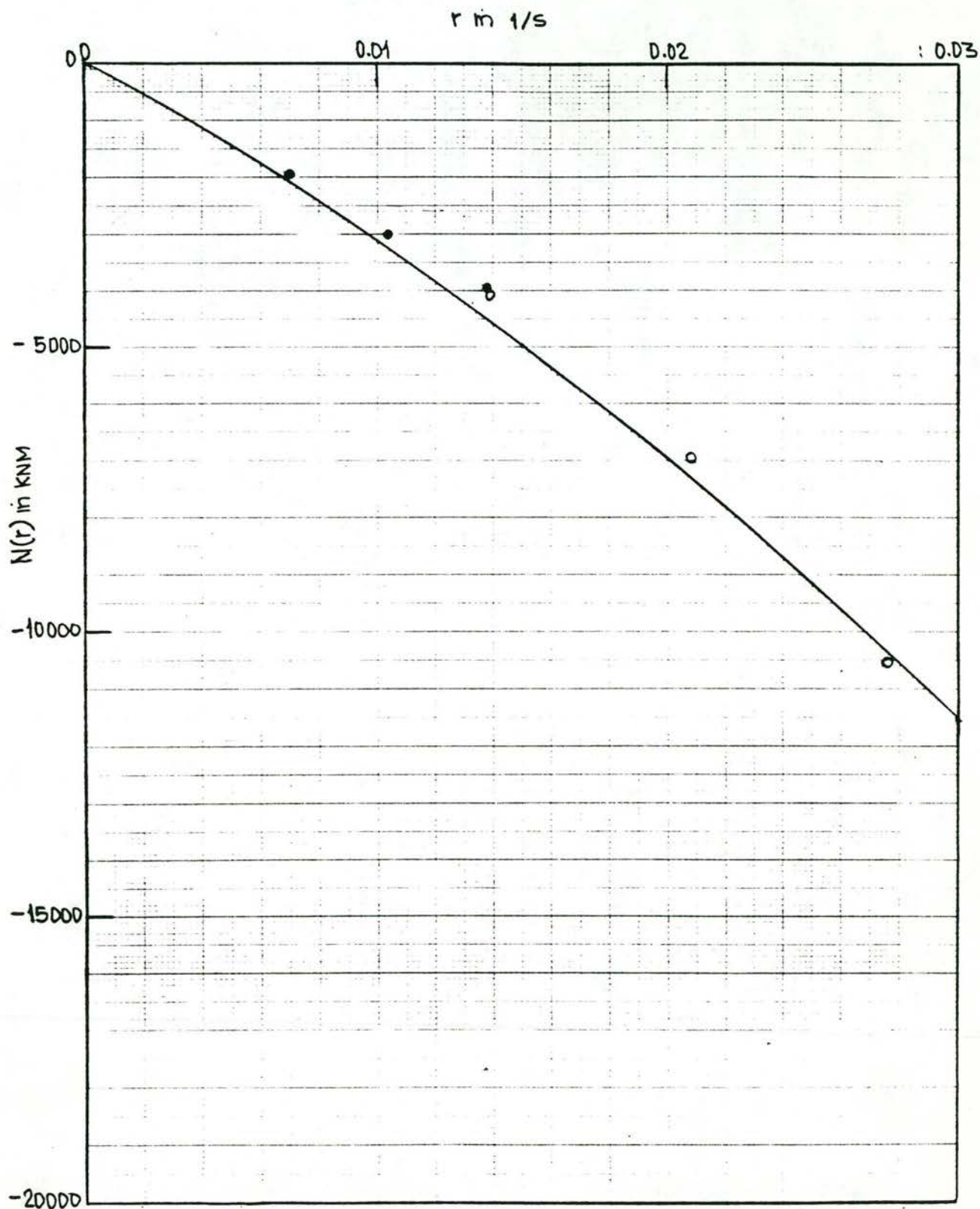
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

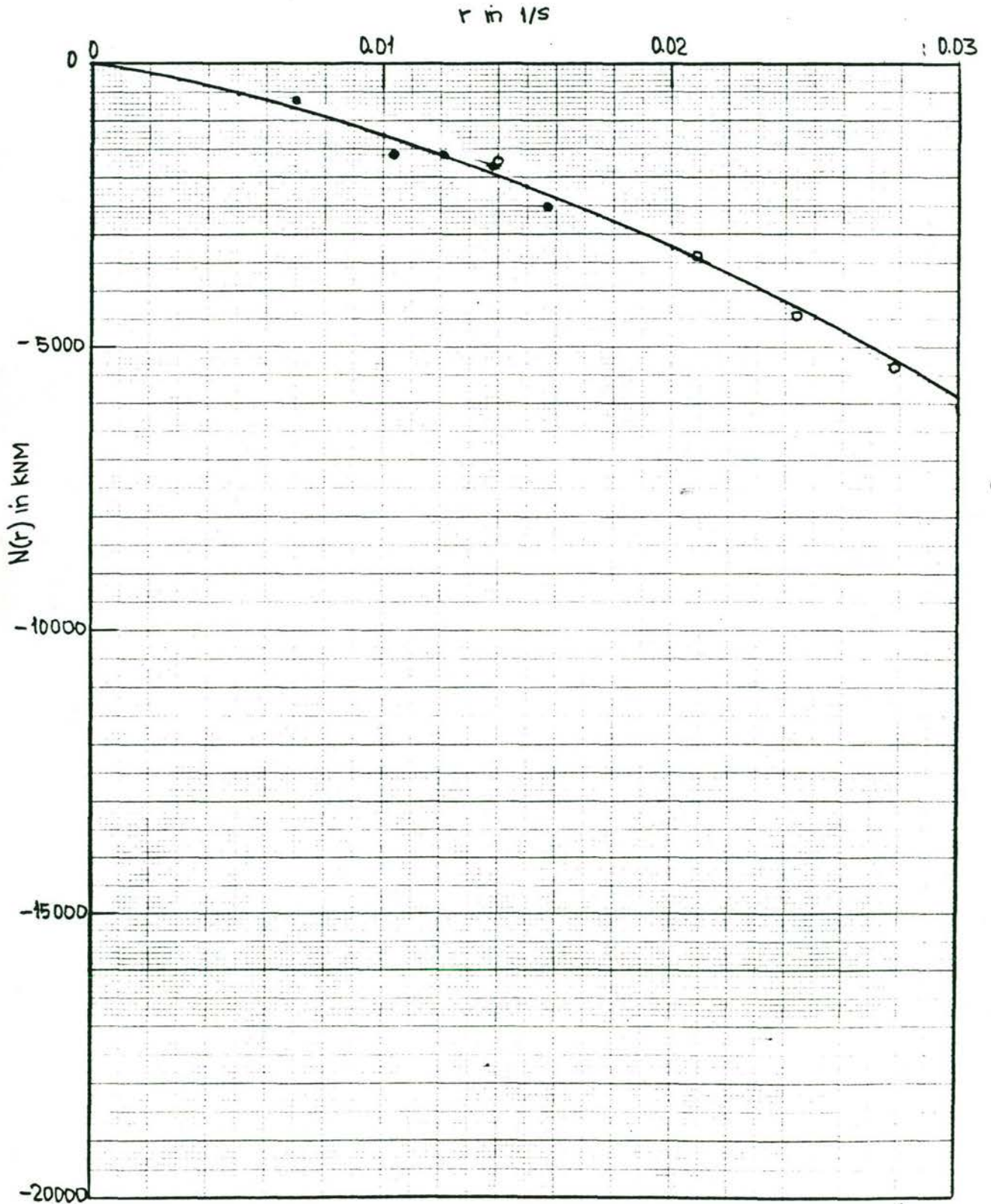
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

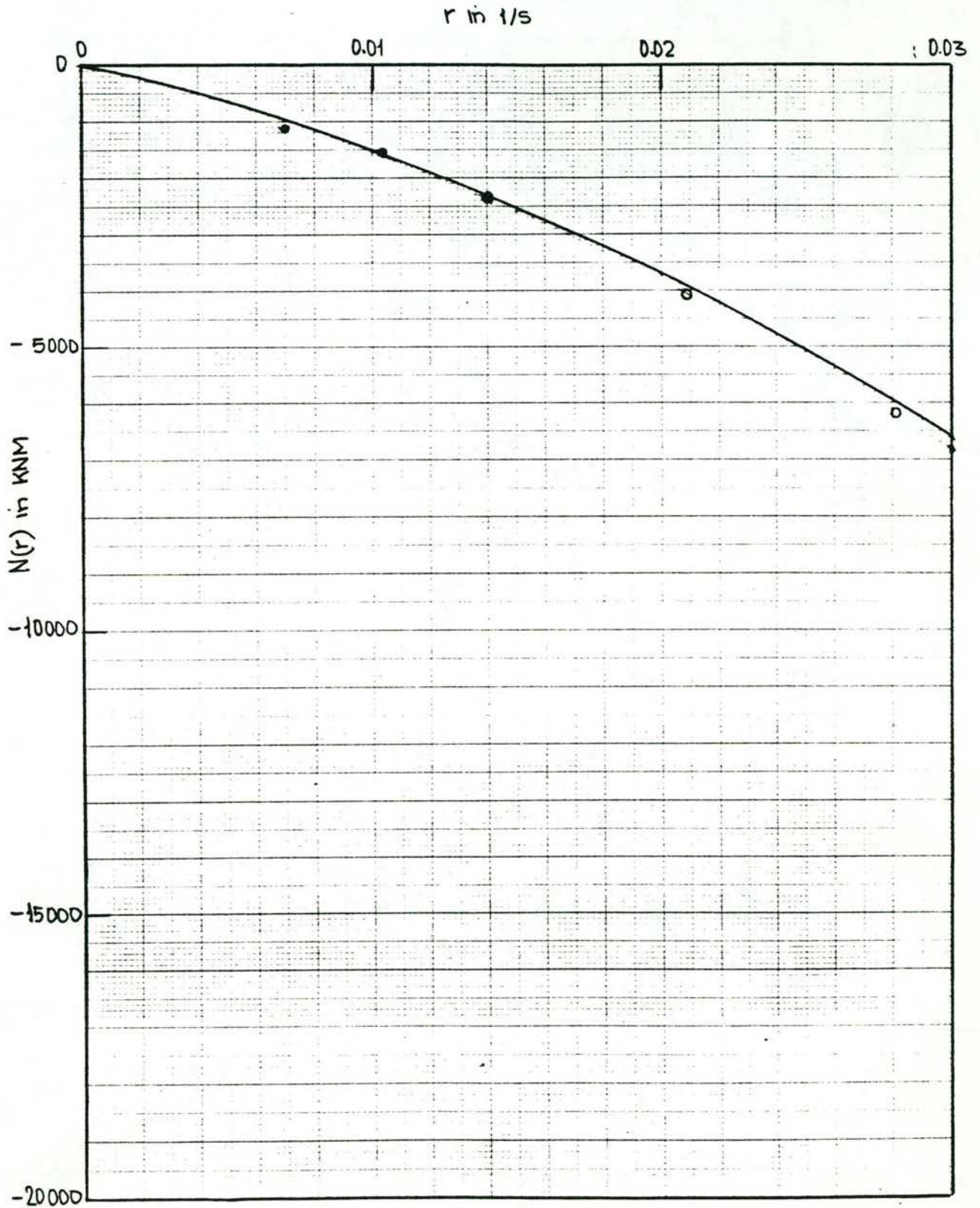
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

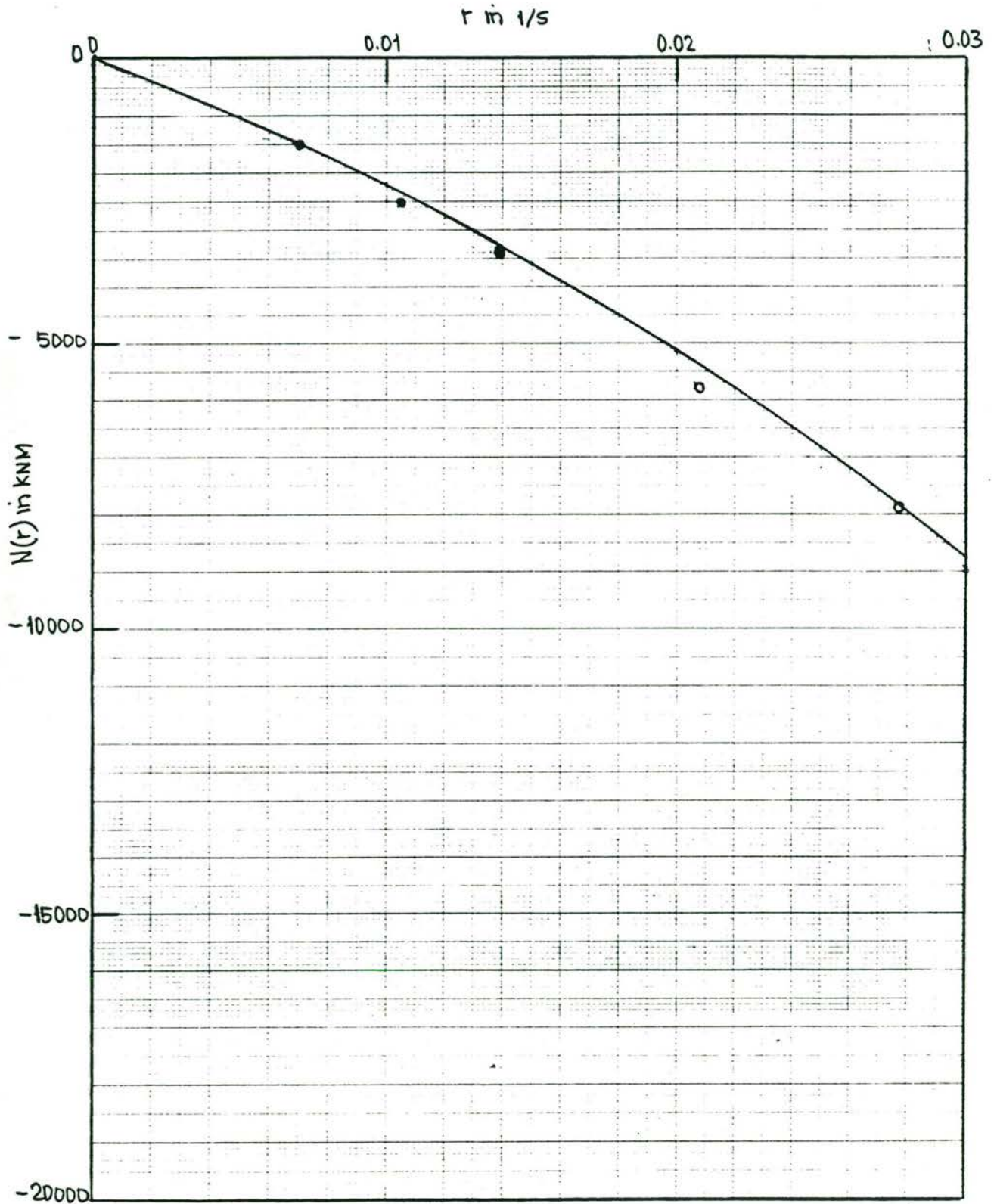
drifthoek : B= 4 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

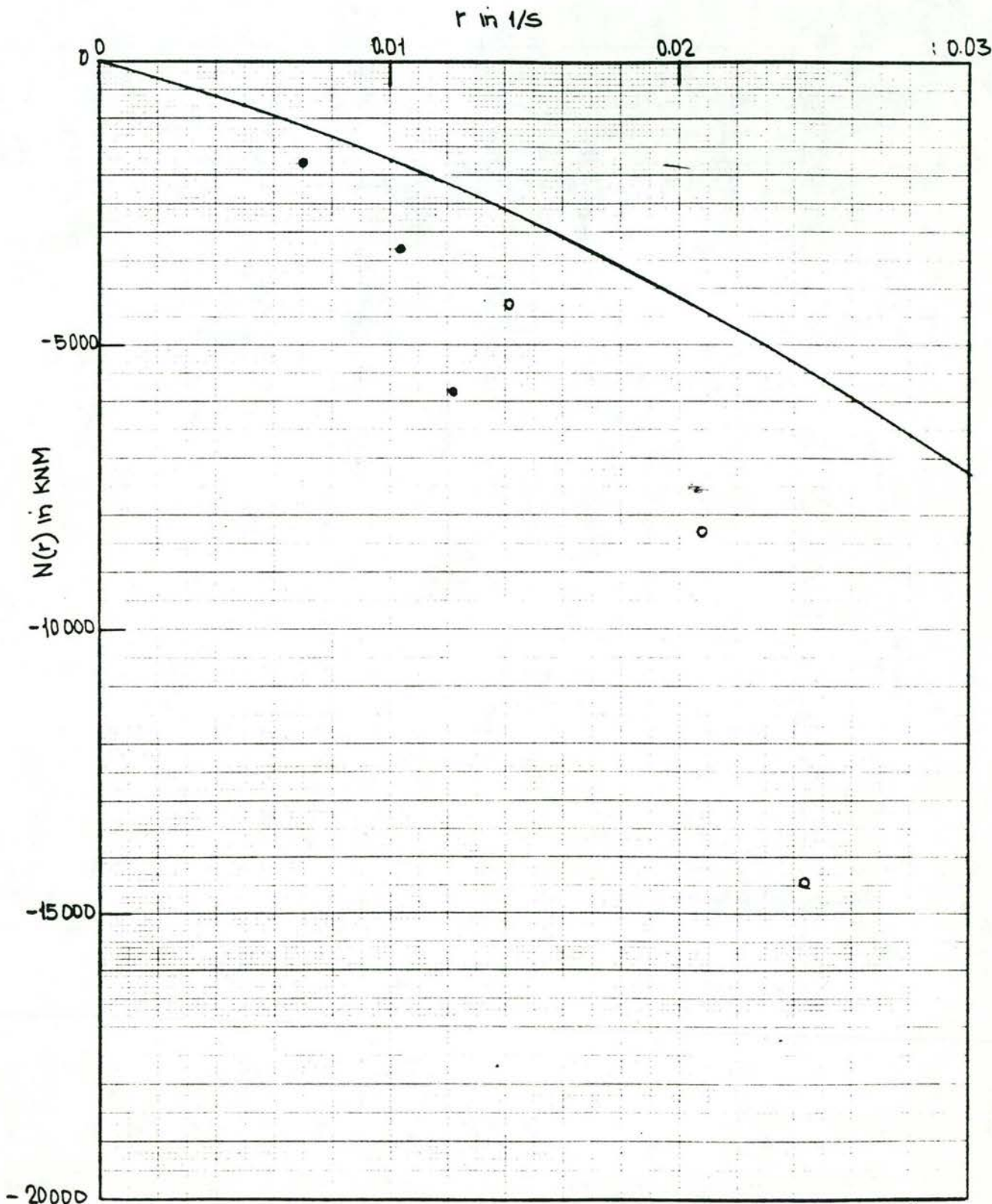
drifthoek : $B = 8$ deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.25 m/s)

 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



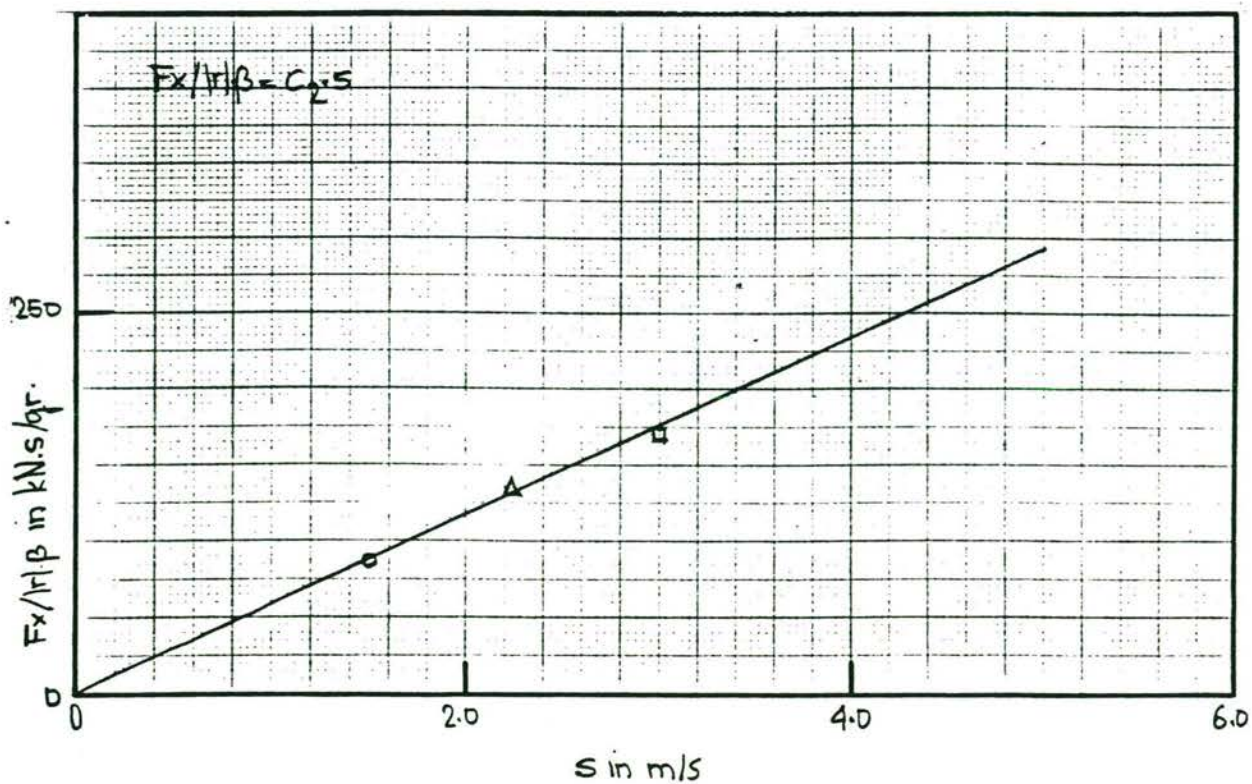
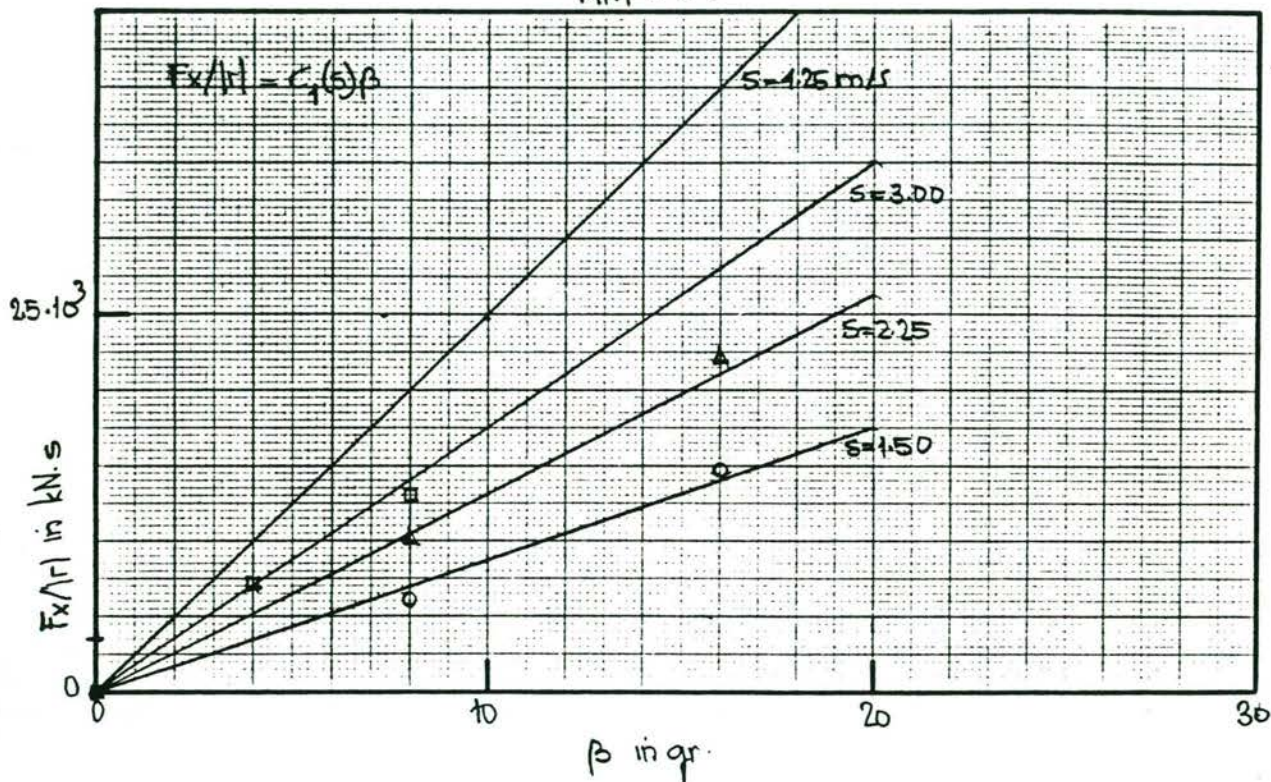
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_x(r) = X_1 |r| |\beta| s \cdot |r| |\beta| s$$

$$\hat{=} X_1 |r| |v| \cdot |r| |v|$$



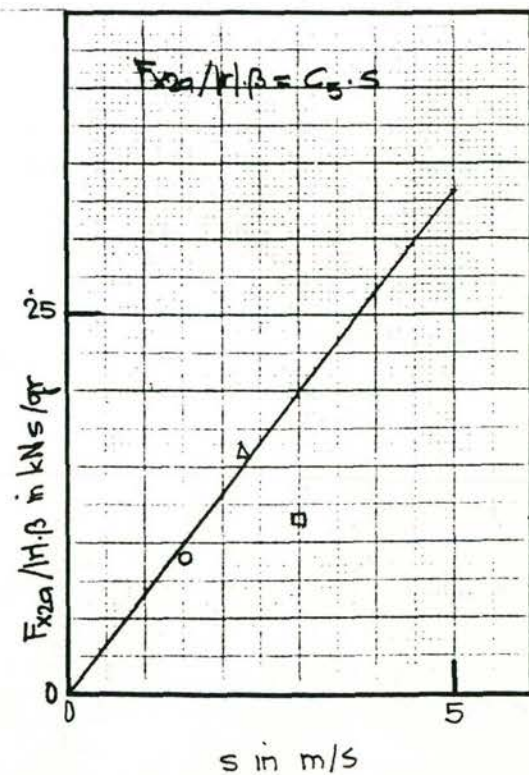
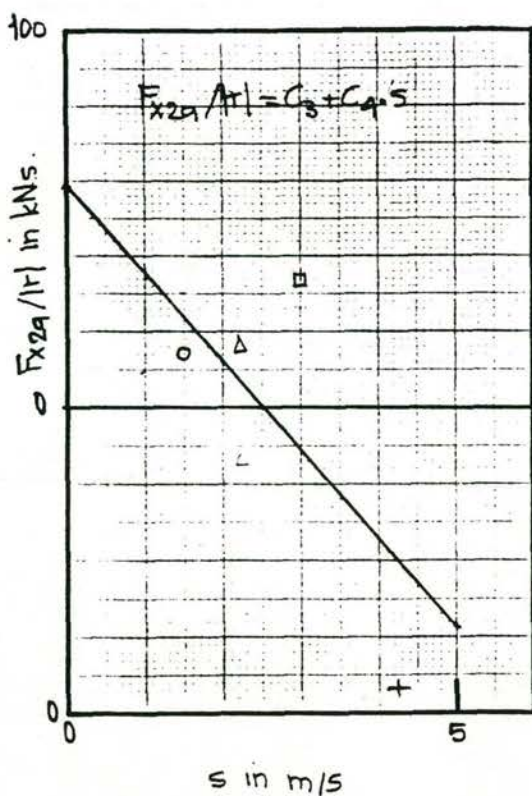
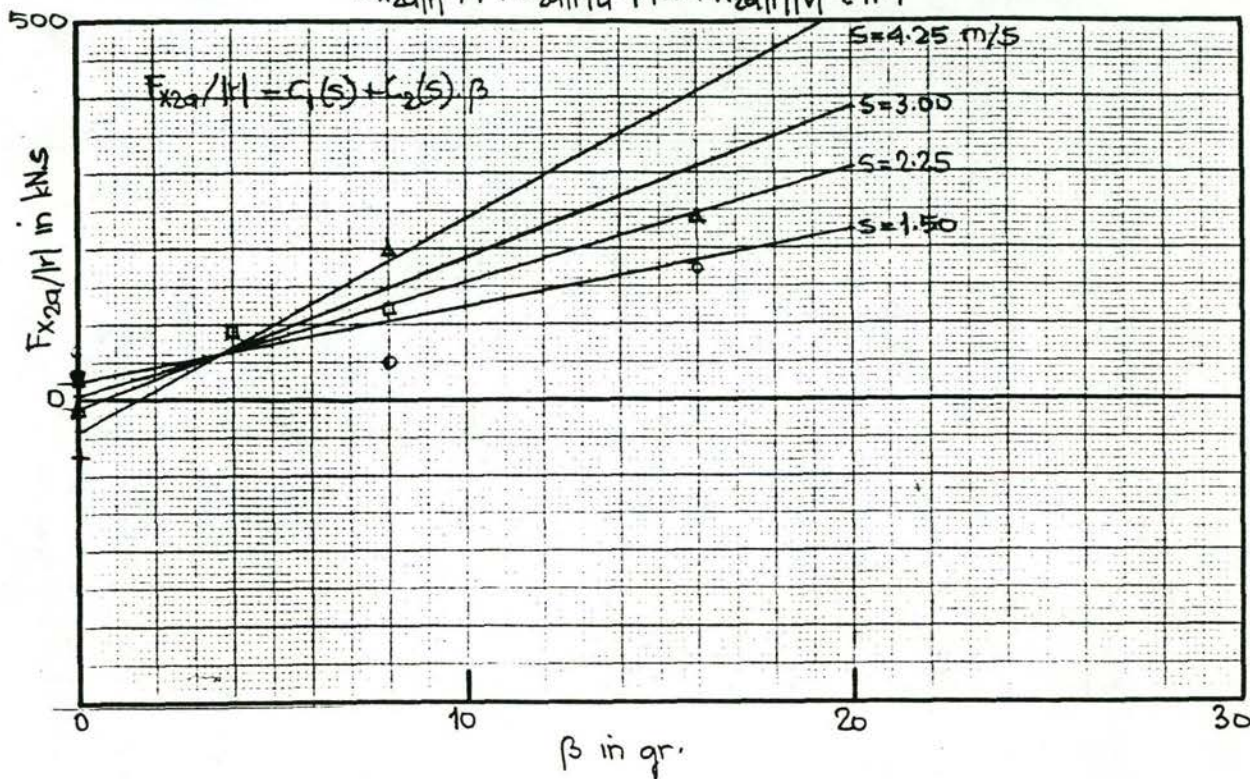
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_{x_{2a}}(r) = X_{2a|r}|r| + X_{2a|r} \cdot |r| \cdot s + X_{2a|r} |\beta| s \cdot |r| \cdot |\beta| \cdot s$$

$$\hat{=} X_{2a|r} \cdot |r| + X_{2a|r} u \cdot |r| u + X_{2a|r} |v| \cdot |r| |v|$$

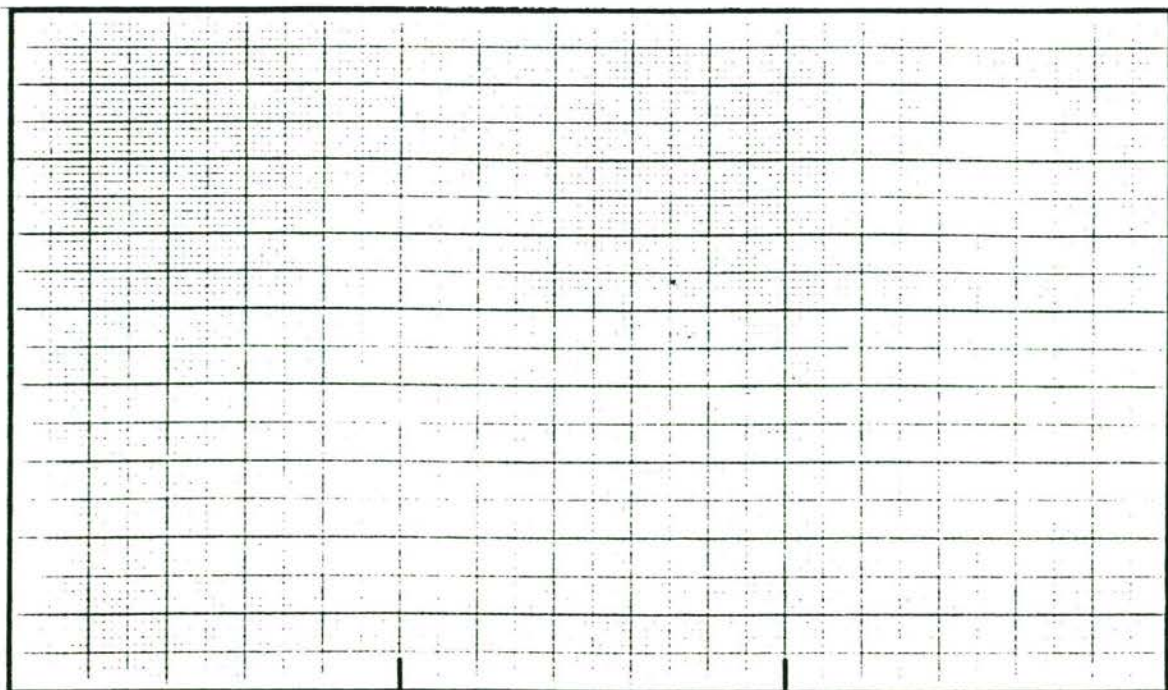
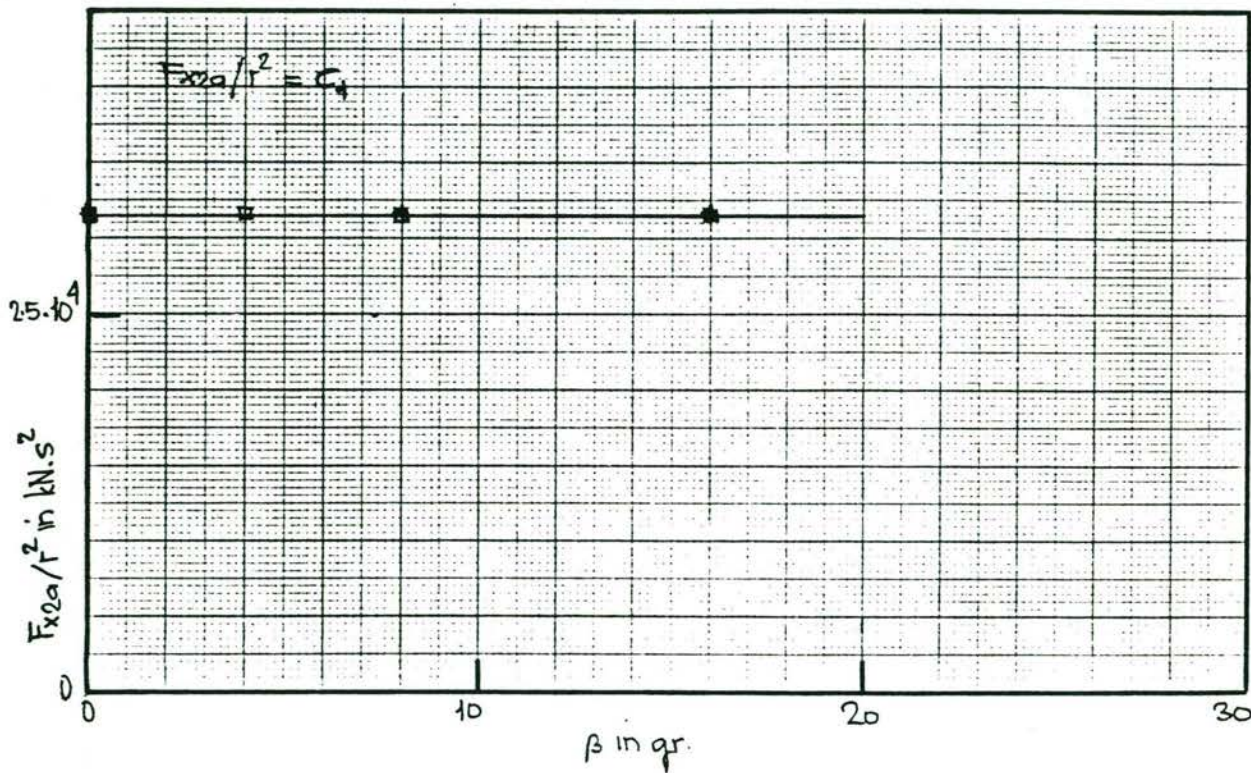


DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_{x2a}(r^2) = X_{2arr} \cdot r^2$$



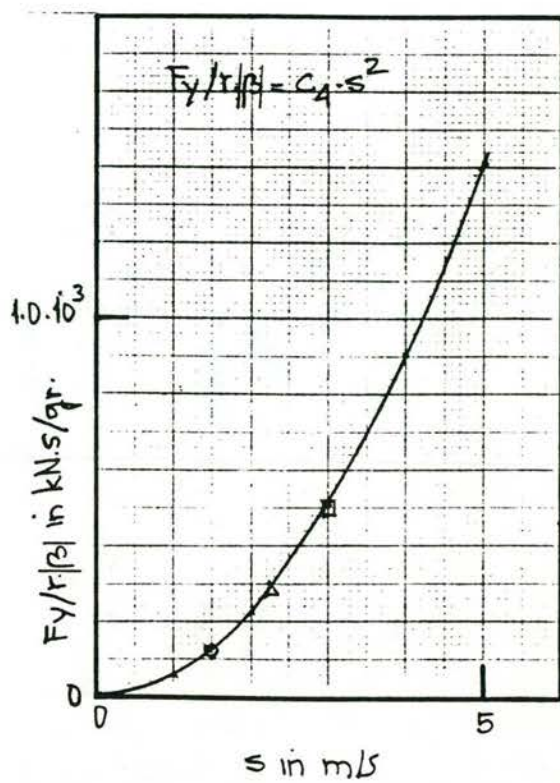
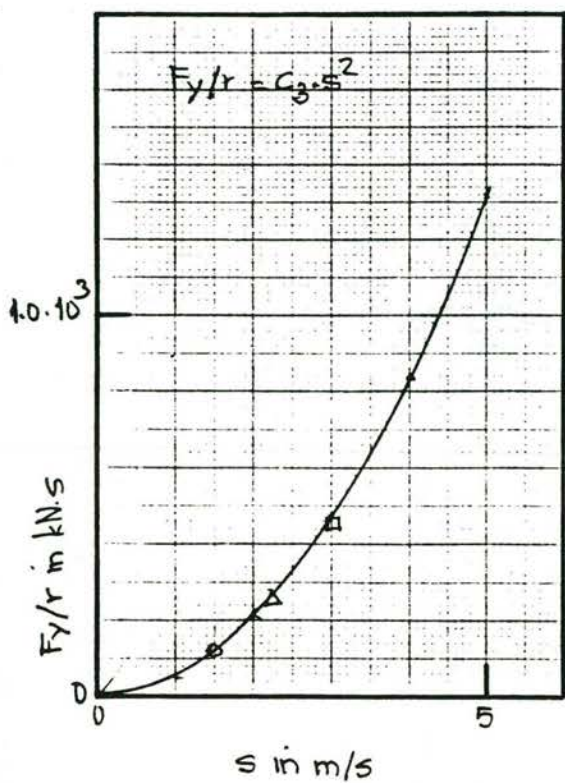
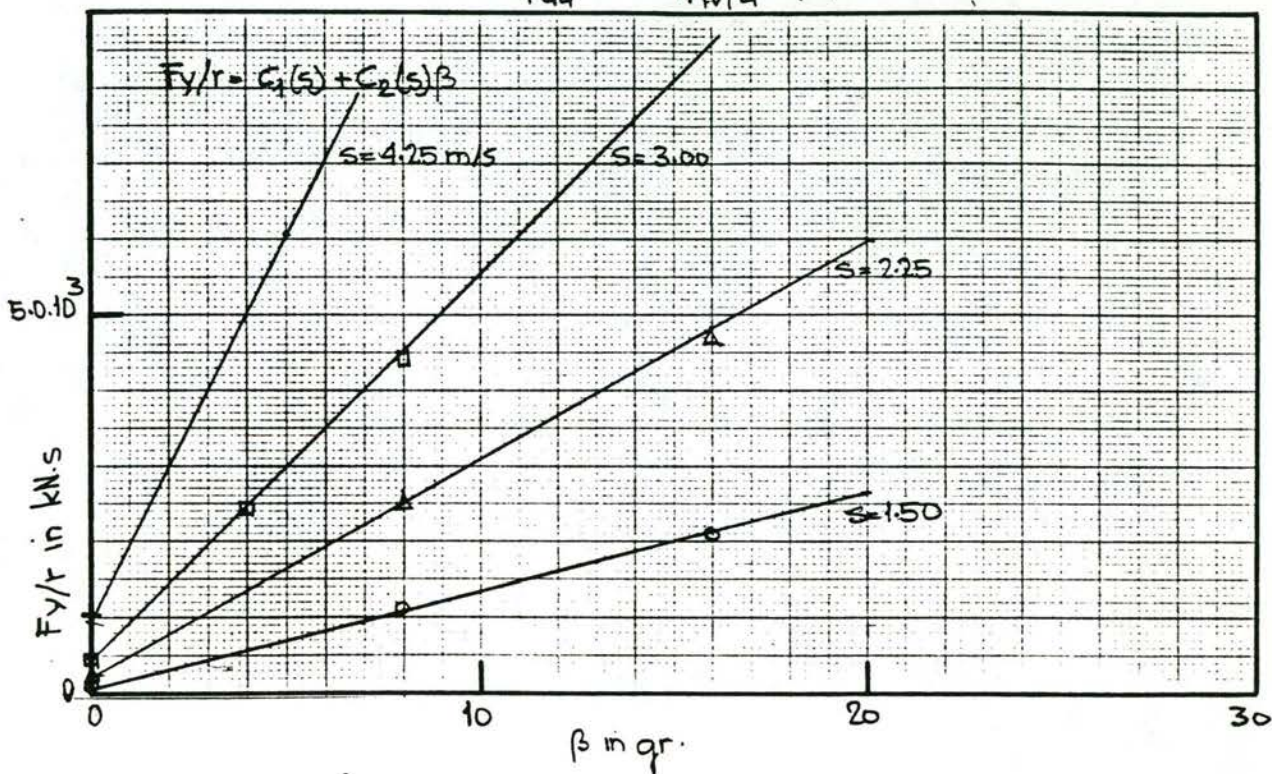
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(r) = Y_{r\dot{s}s} \cdot r \cdot s^2 + Y_{r\beta|\dot{s}s} \cdot r/\beta \cdot s^2$$

$$\hat{=} Y_{r\dot{u}u} \cdot r \cdot u^2 + Y_{r\dot{v}|u} \cdot r/v \cdot u$$



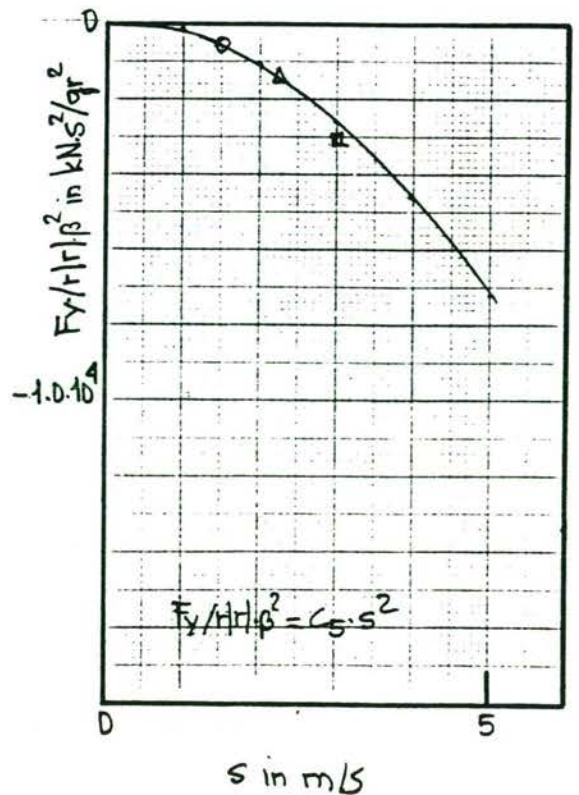
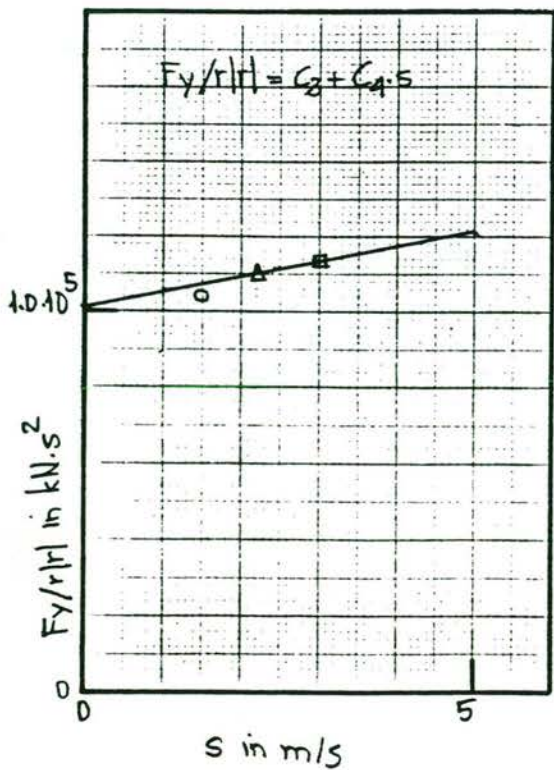
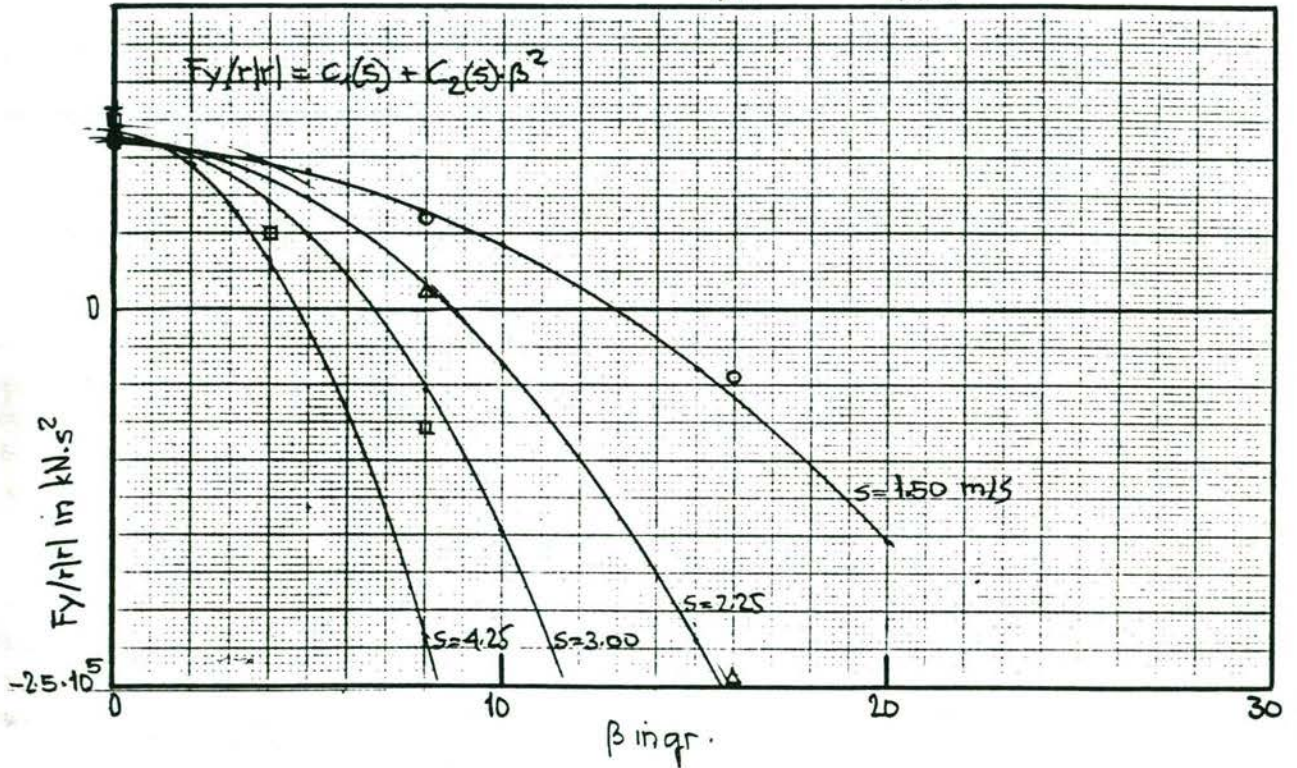
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(r|l) = Y_{r|l} \cdot r|l + Y_{r|l s} \cdot r|l s + Y_{r|l \beta s s} \cdot r|l \cdot \beta^2 \cdot s^2$$

$$\cong Y_{r|l} \cdot r|l + Y_{r|l u} \cdot r|l u + Y_{r|l v} \cdot r|l v^2$$



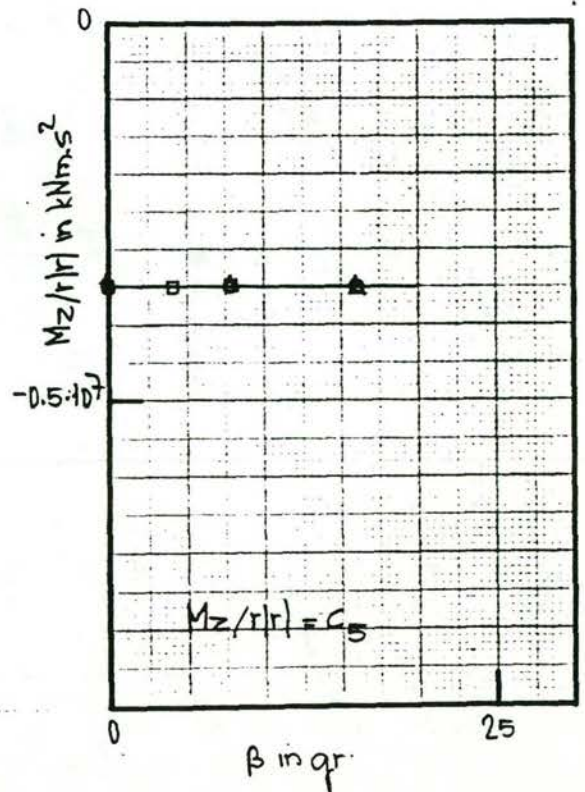
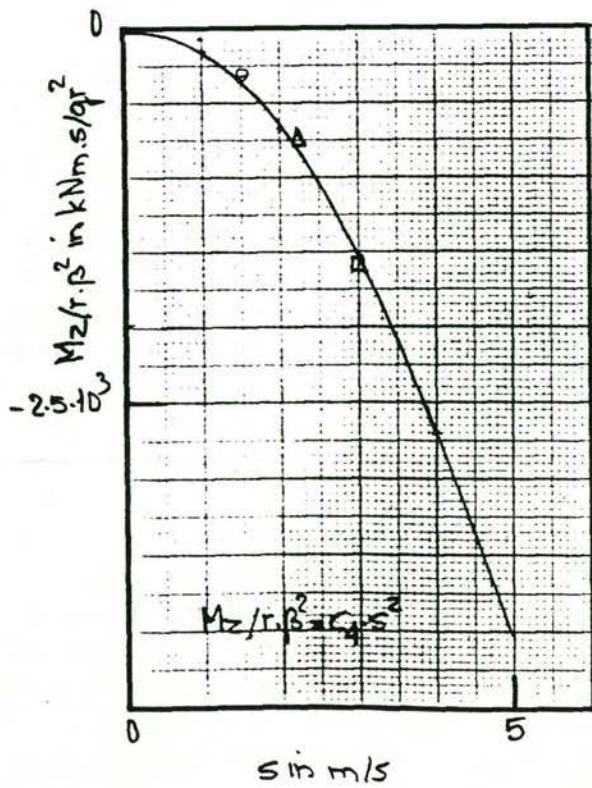
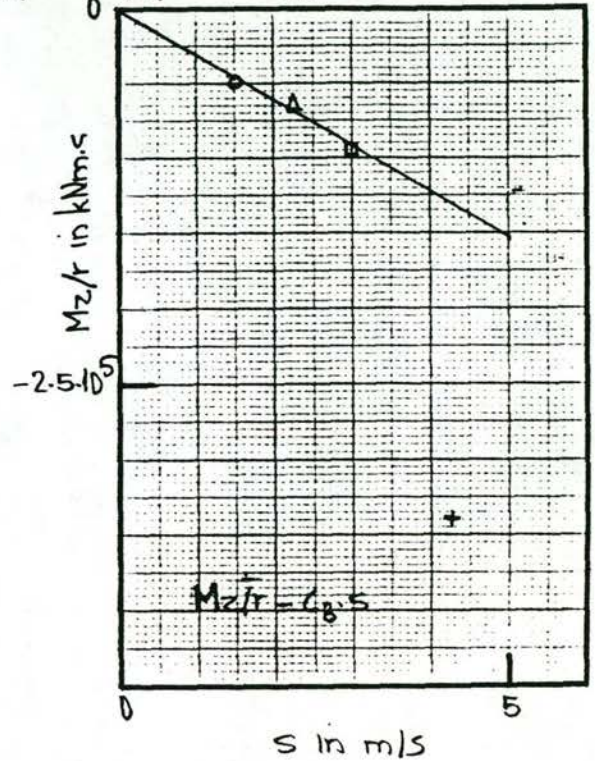
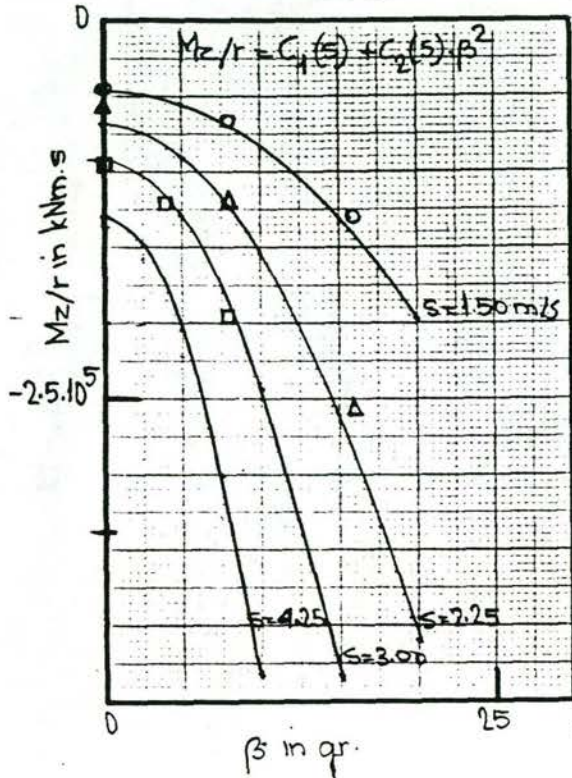
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$M_z(r) = M_z(r) + M_z(r^2) = N_{rs} \cdot r \cdot s + N_{r\beta s s} \cdot r \cdot \beta^2 s^2 + N_{r|r|} \cdot r|r|$$

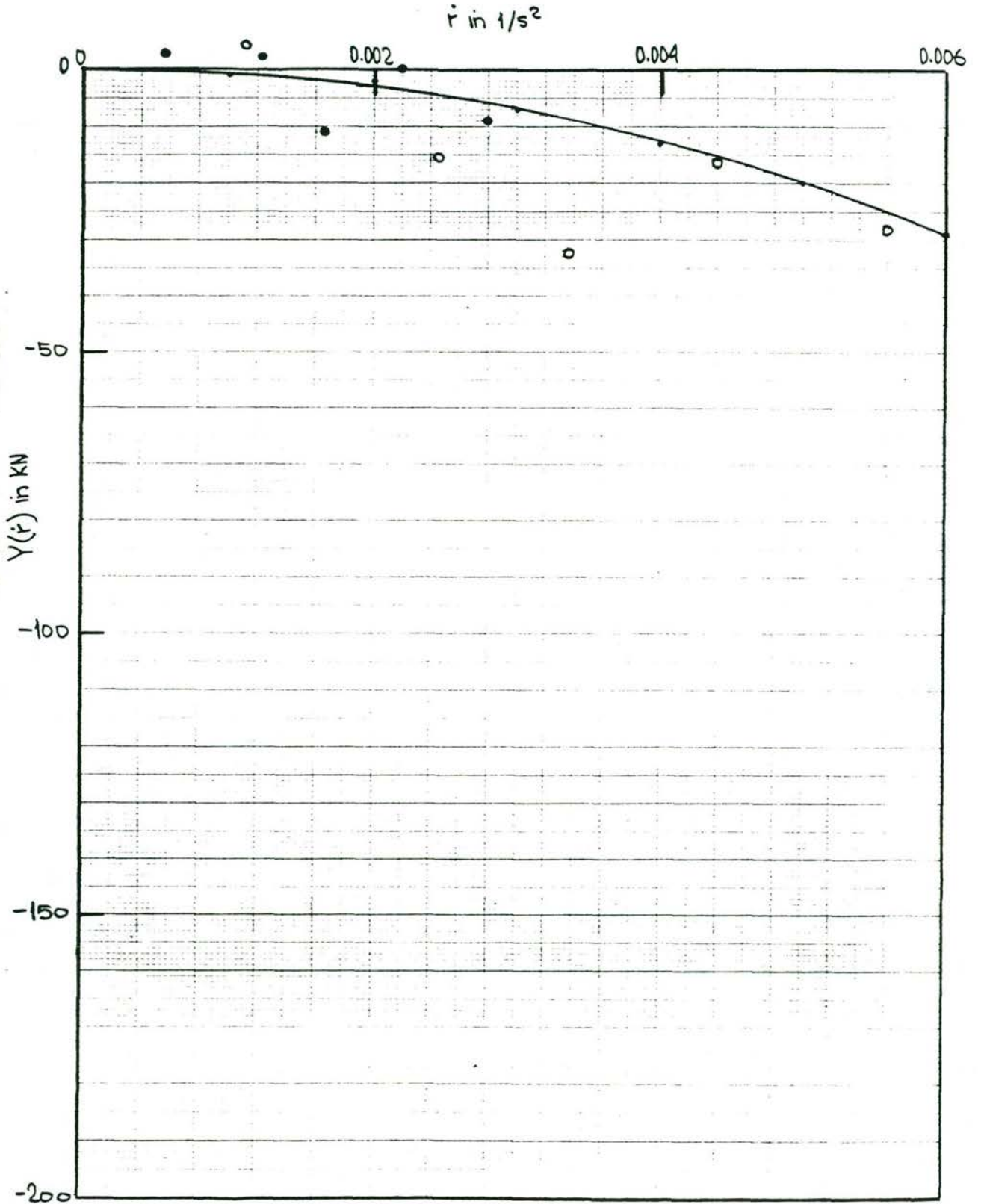
$$\hat{=} N_{ru} \cdot r \cdot u + N_{rvv} \cdot r \cdot v^2 + N_{r|r|} \cdot r|r|$$



DVK Projekt Windhinder
rijn-Rerne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

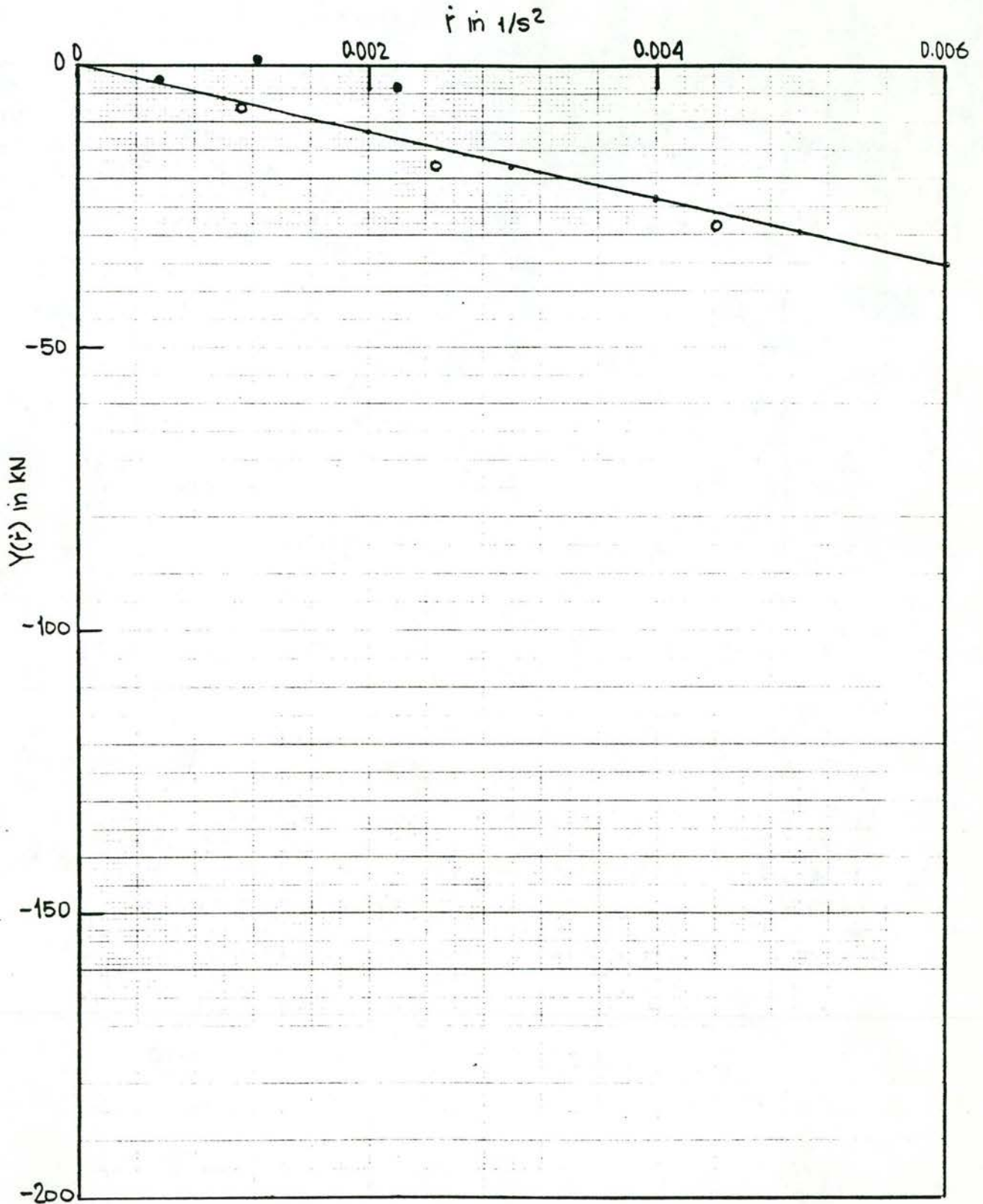
drifthoek : B= 0 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

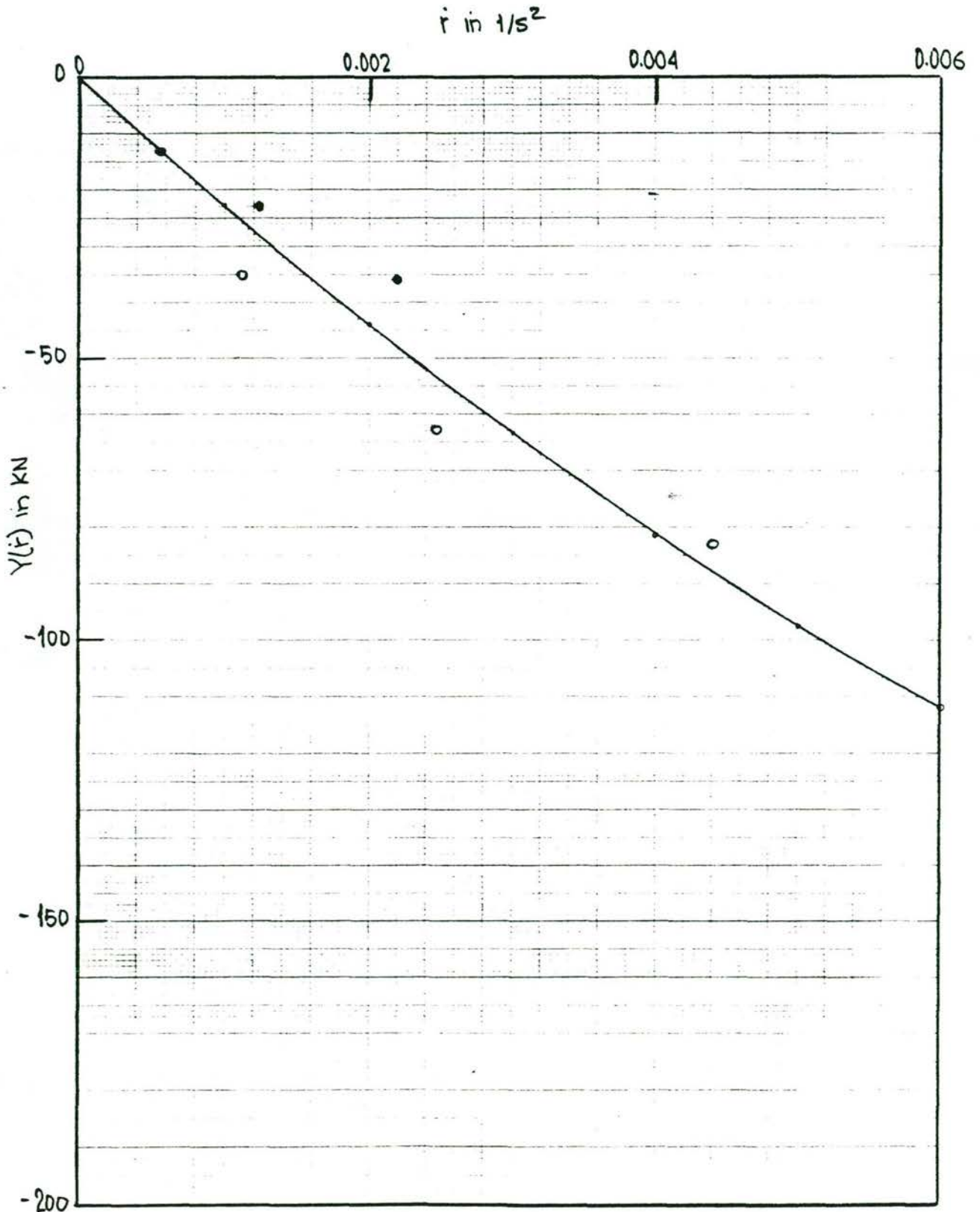
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

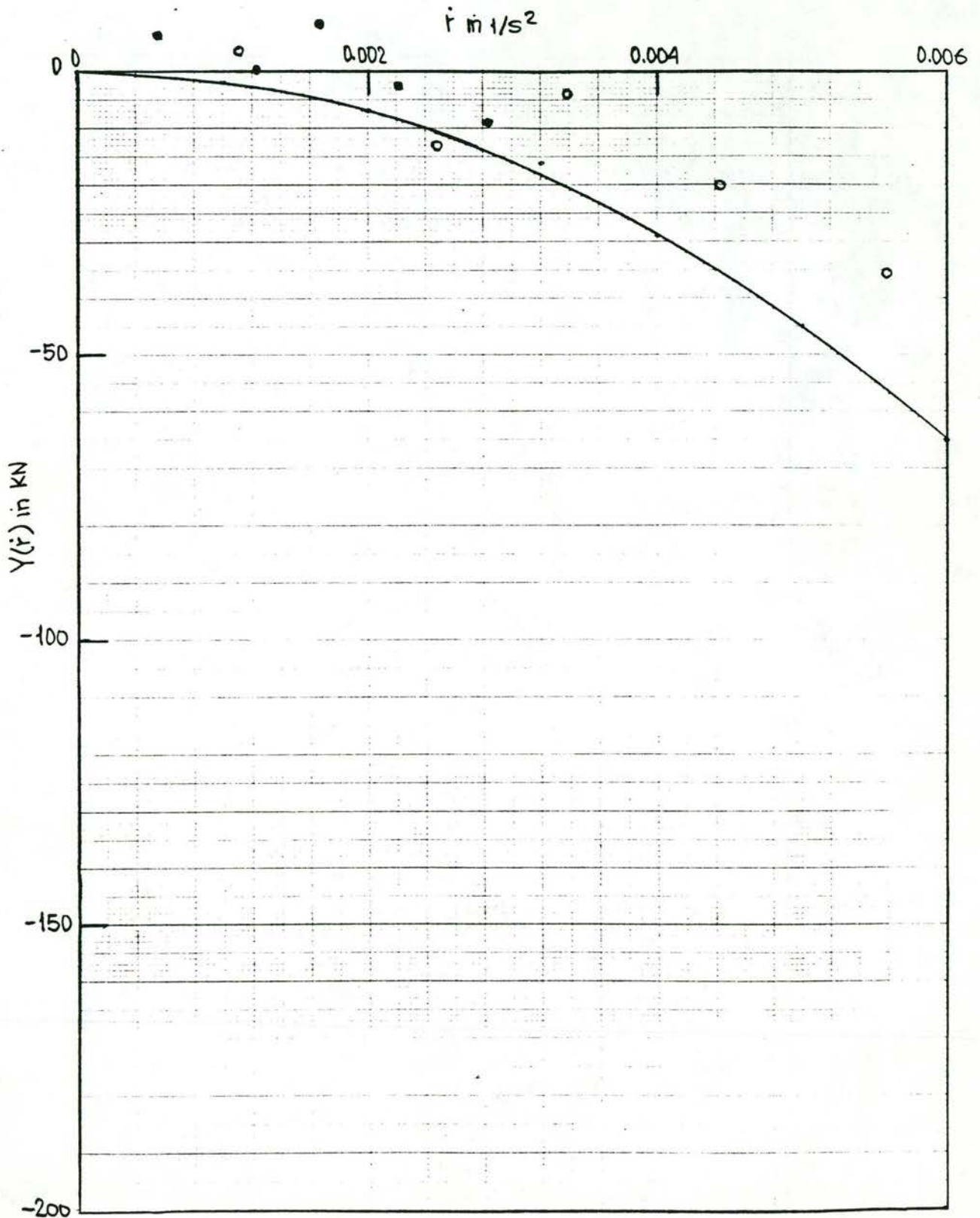
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-kerne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

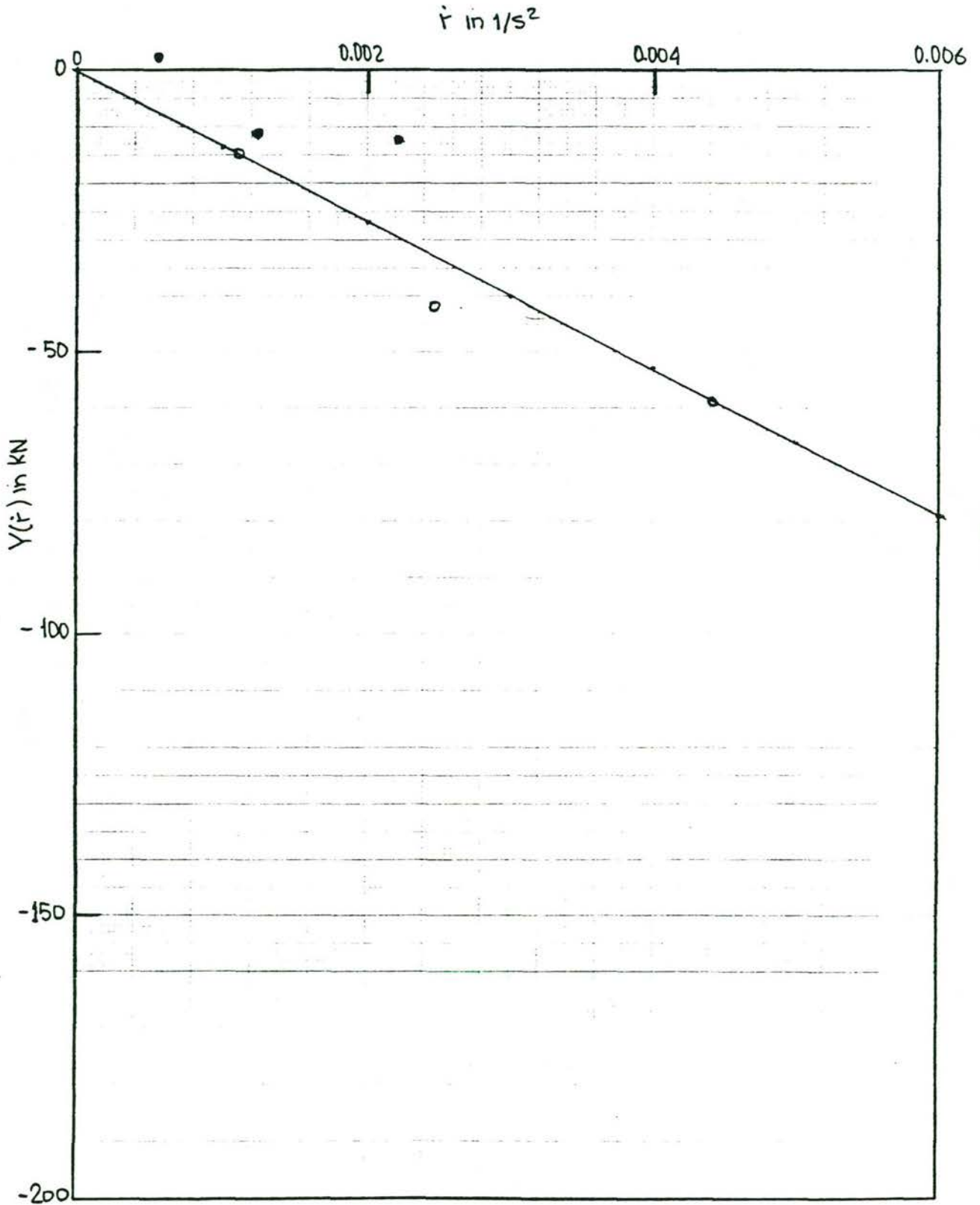
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

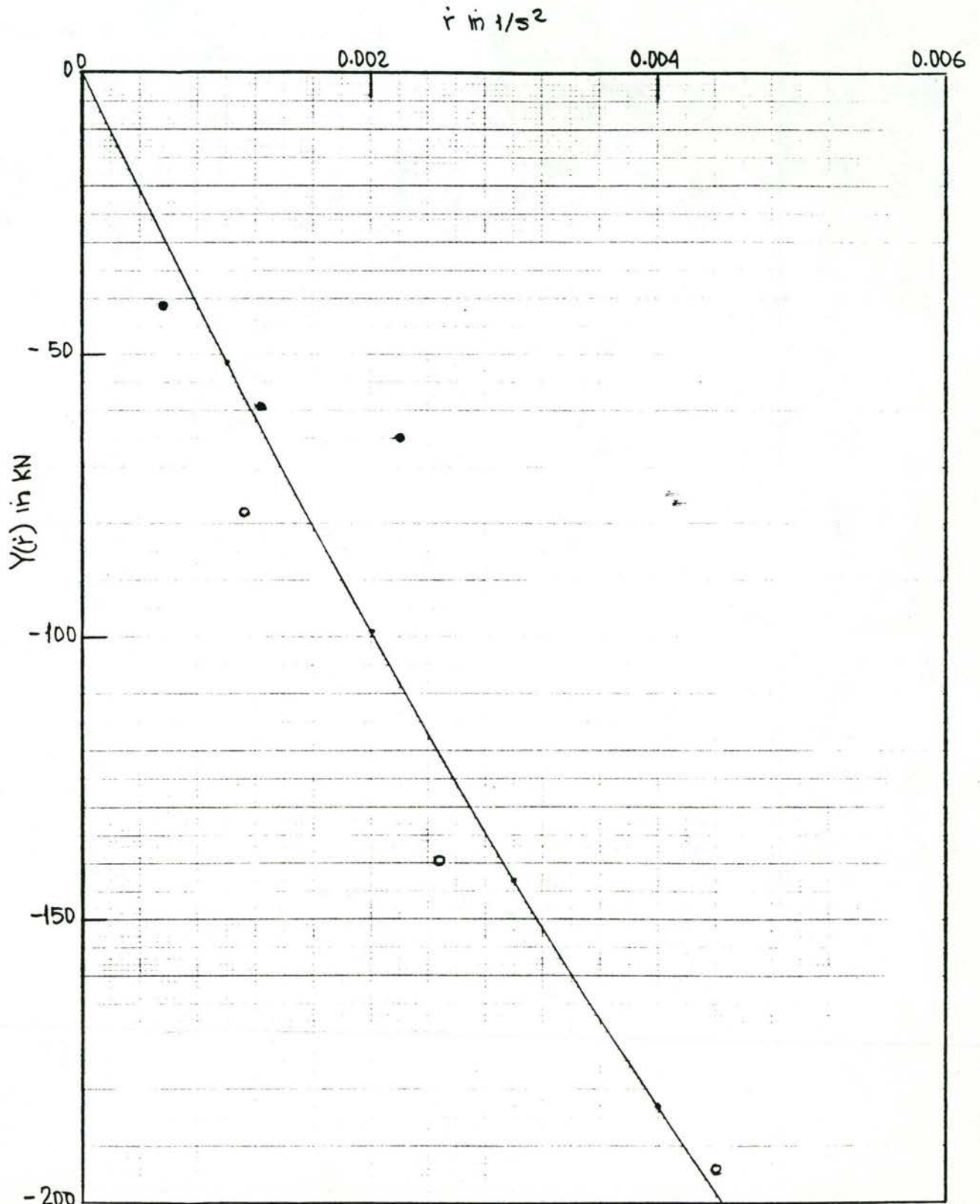
 drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-ferne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

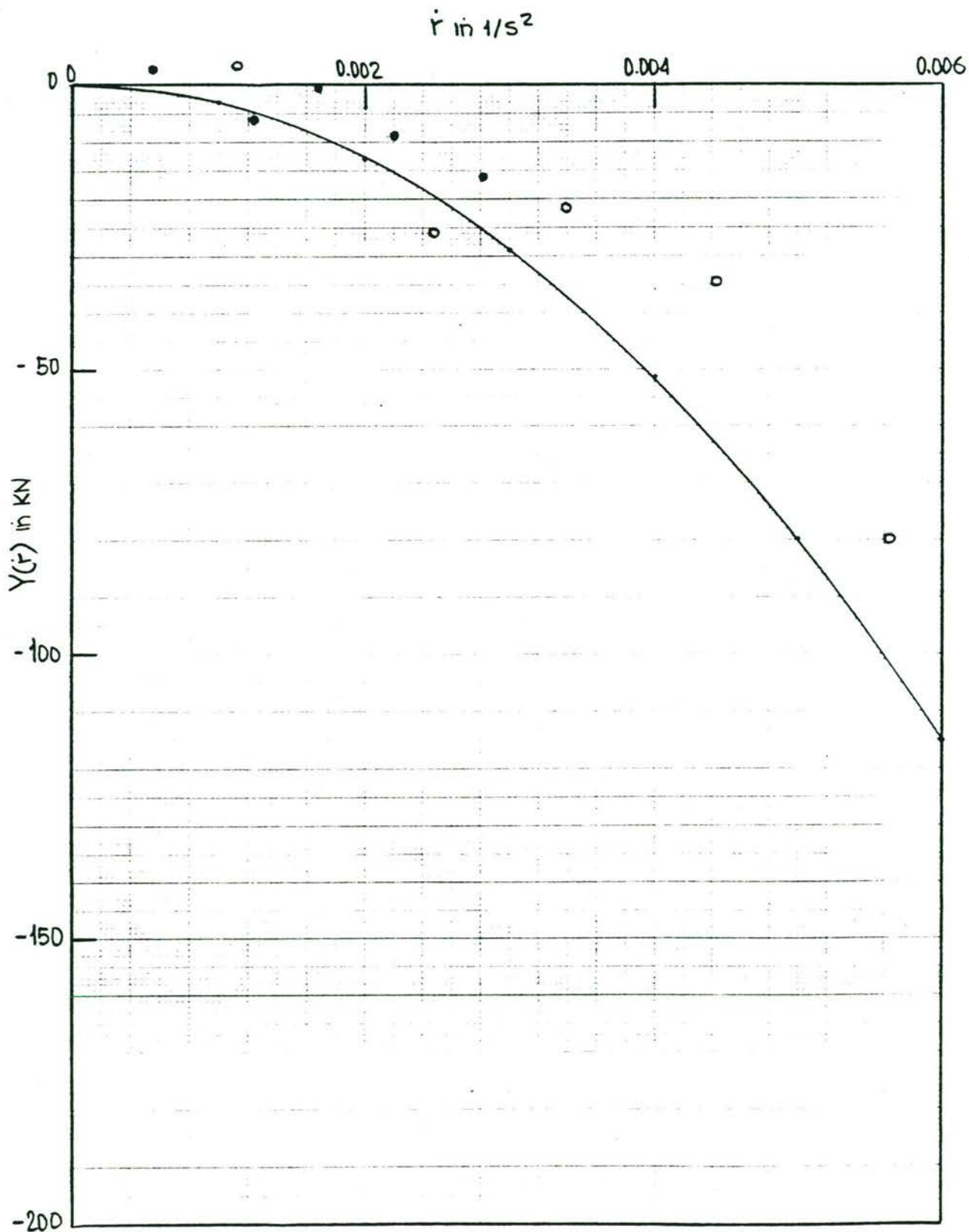
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

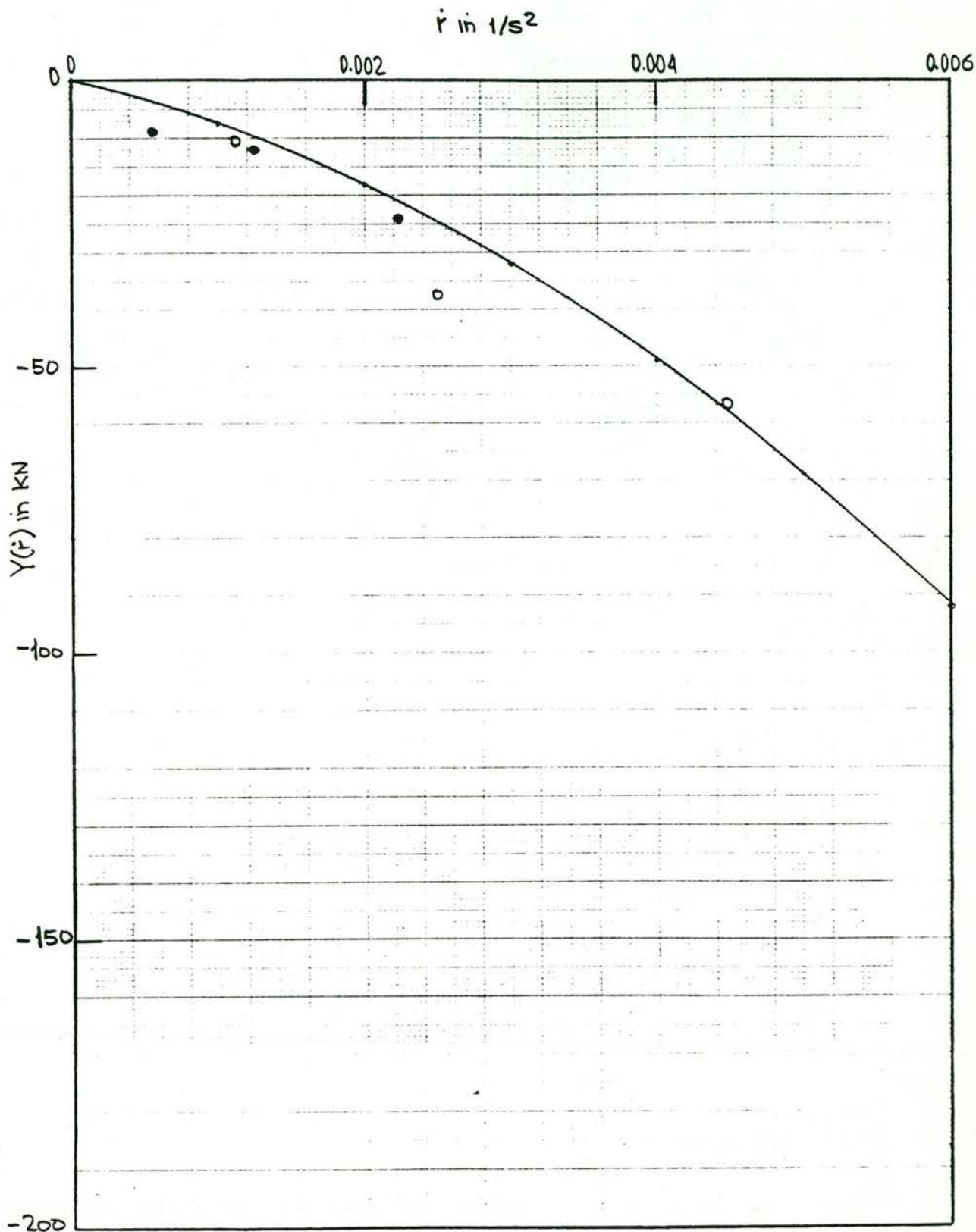
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

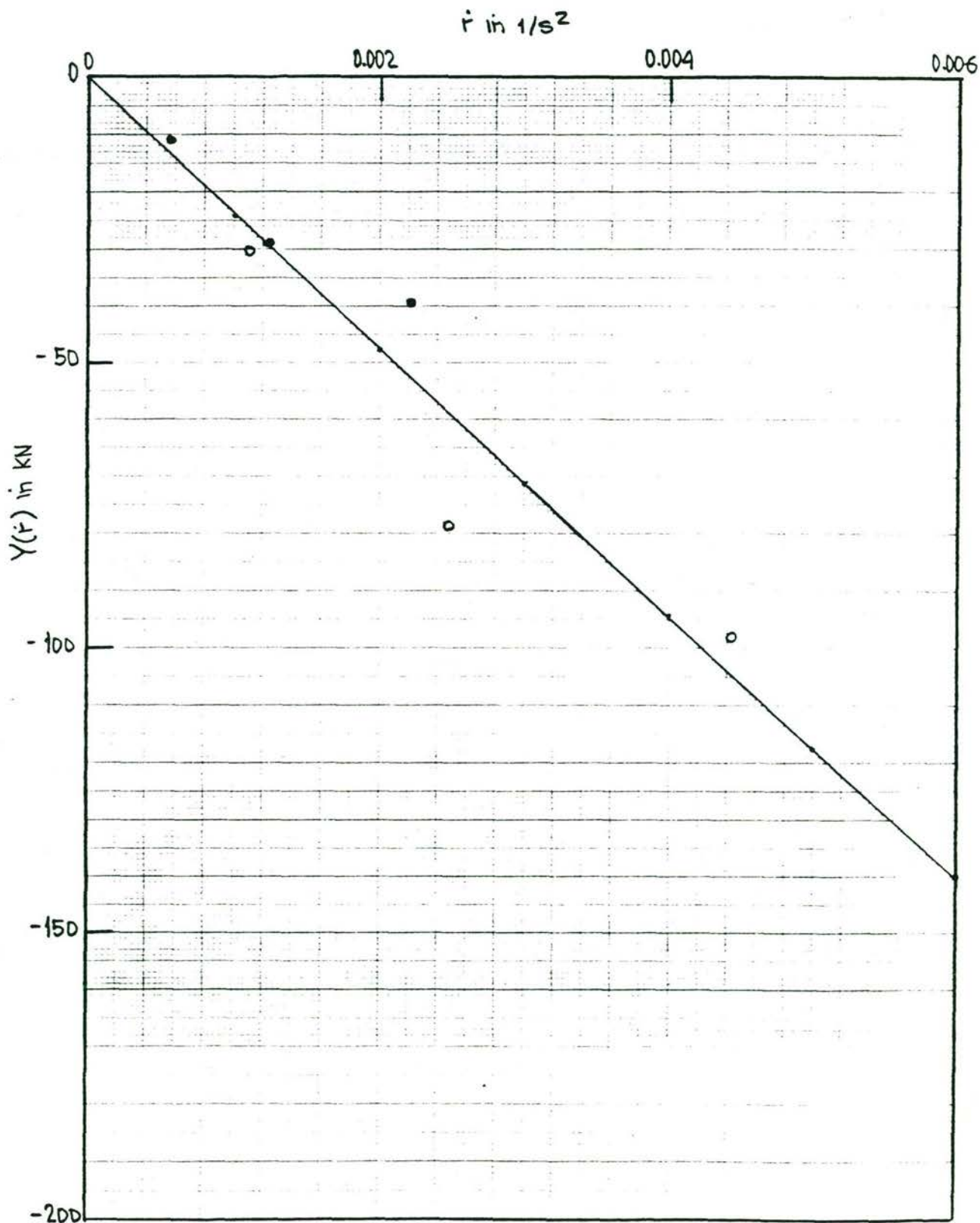
drifthoek : B= 4 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-terre: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

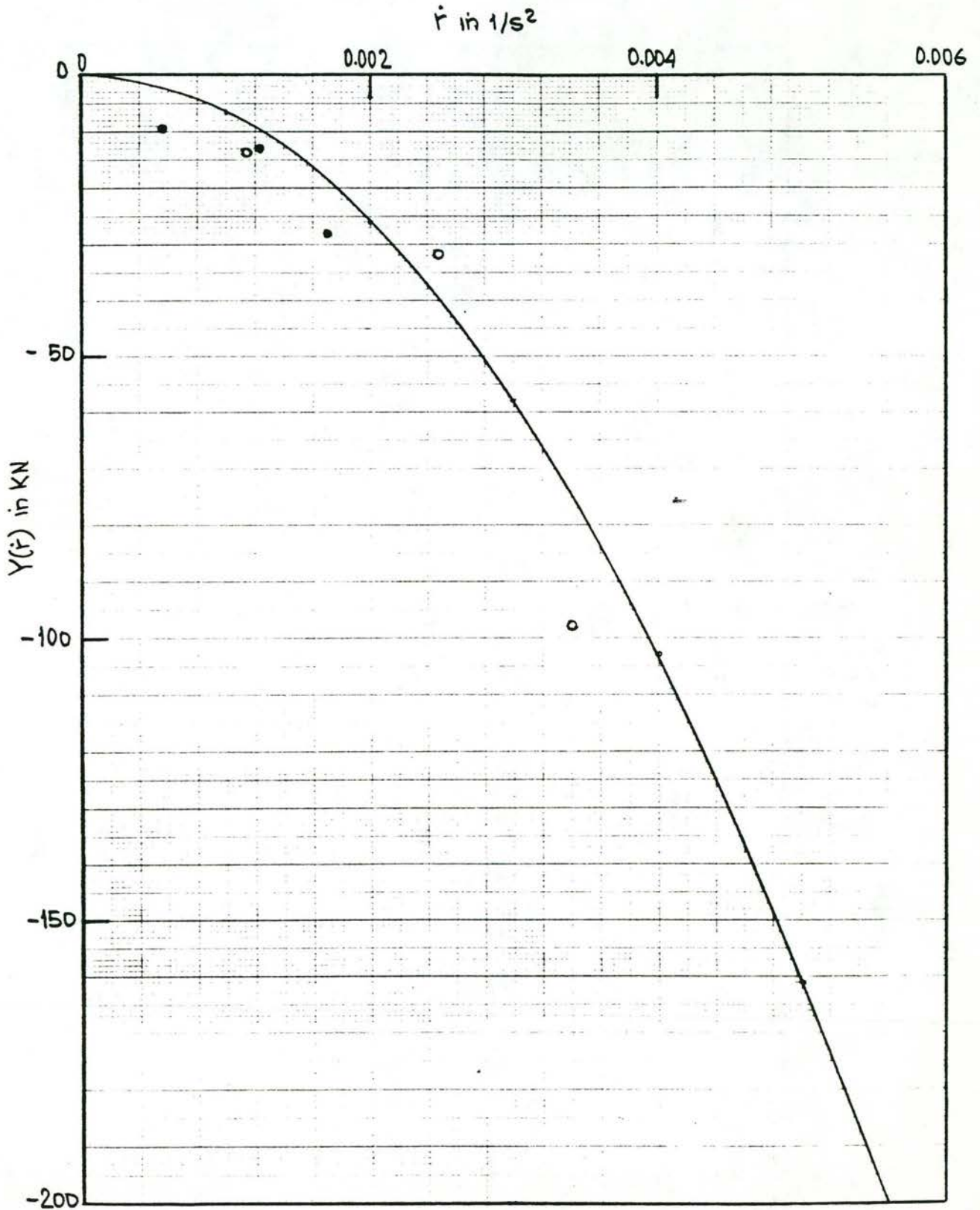
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.25 m/s)

drifthoek : B= 0 deg
amplitude 5.0 graden : o
amplitude 10.0 graden : o



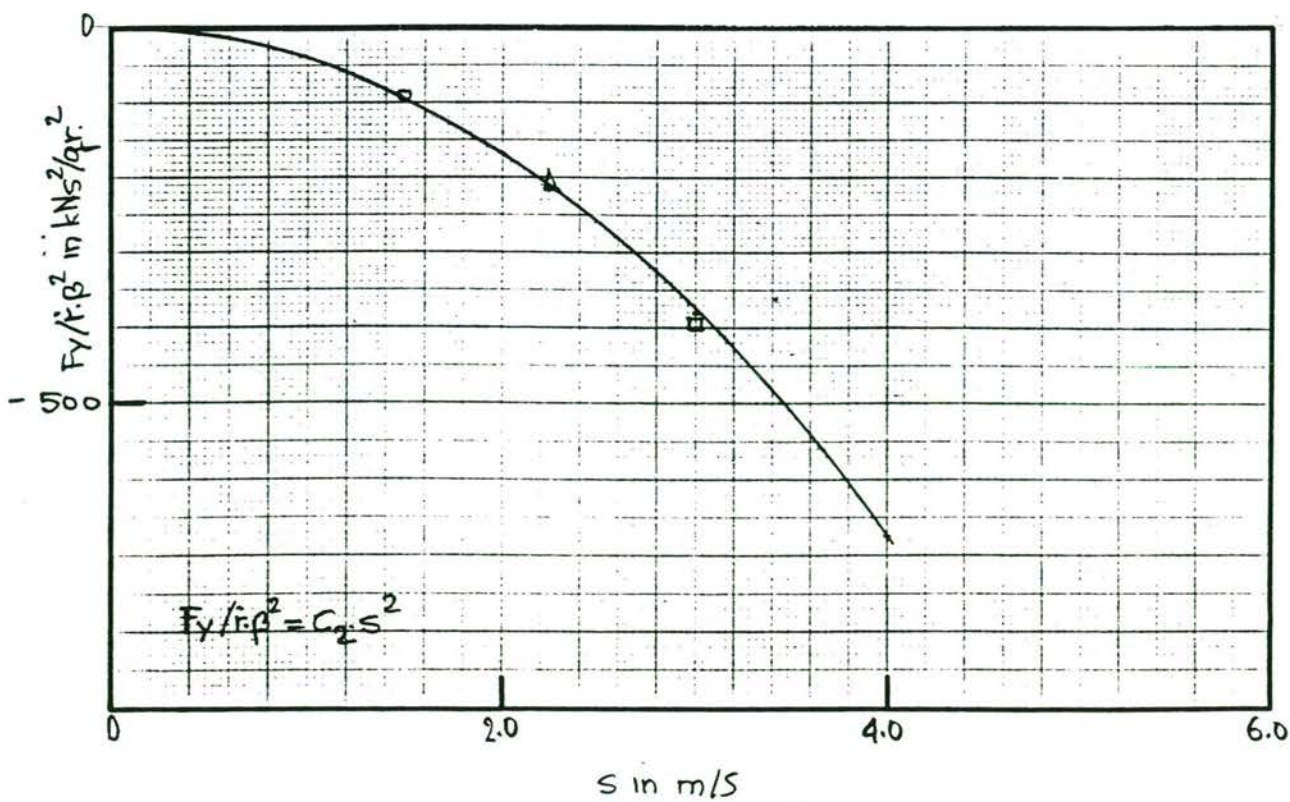
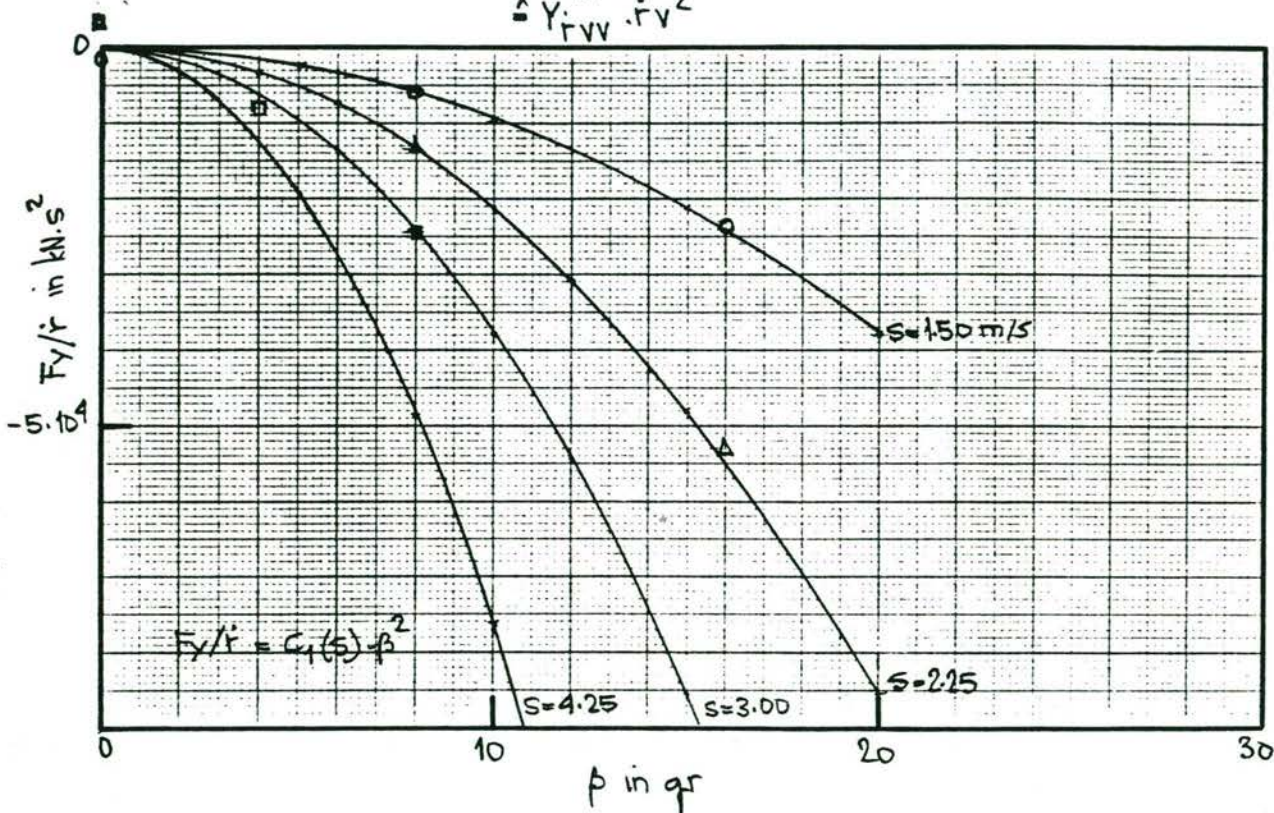
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(\dot{r}) = Y_{r\beta s s} \cdot \dot{r} \beta^2 s^2$$

$$\hat{=} Y_{r v v} \cdot \dot{r} v^2$$



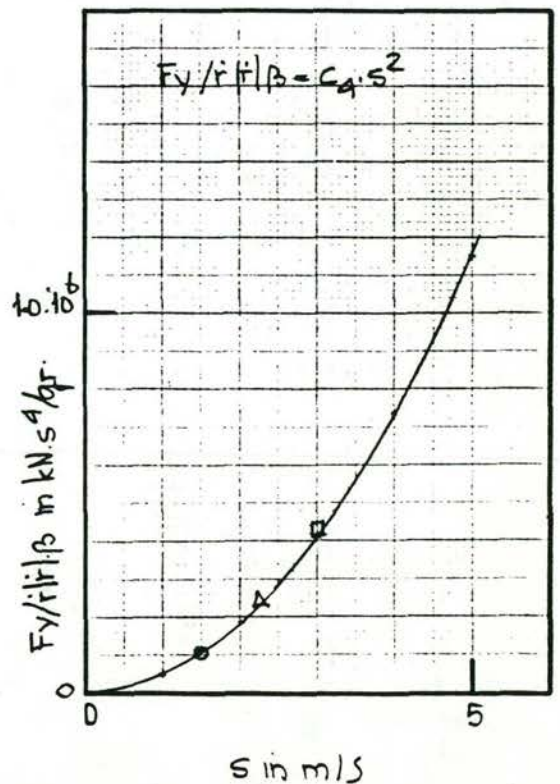
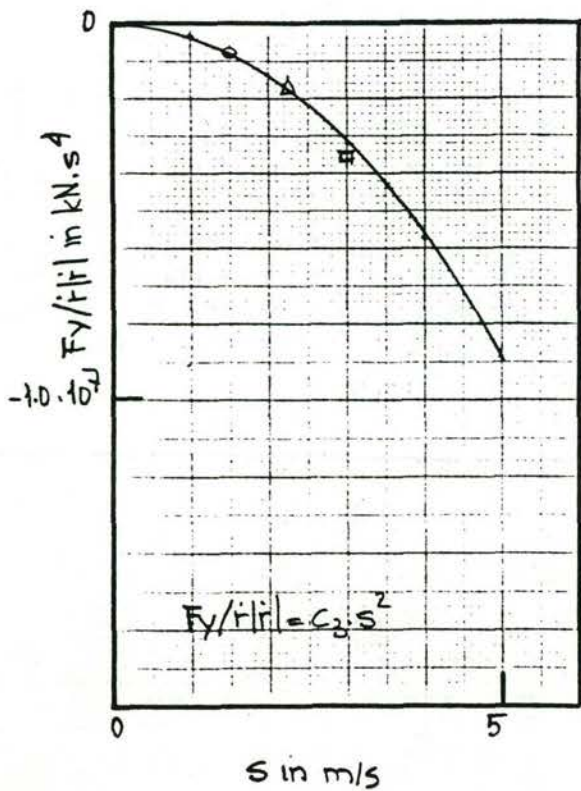
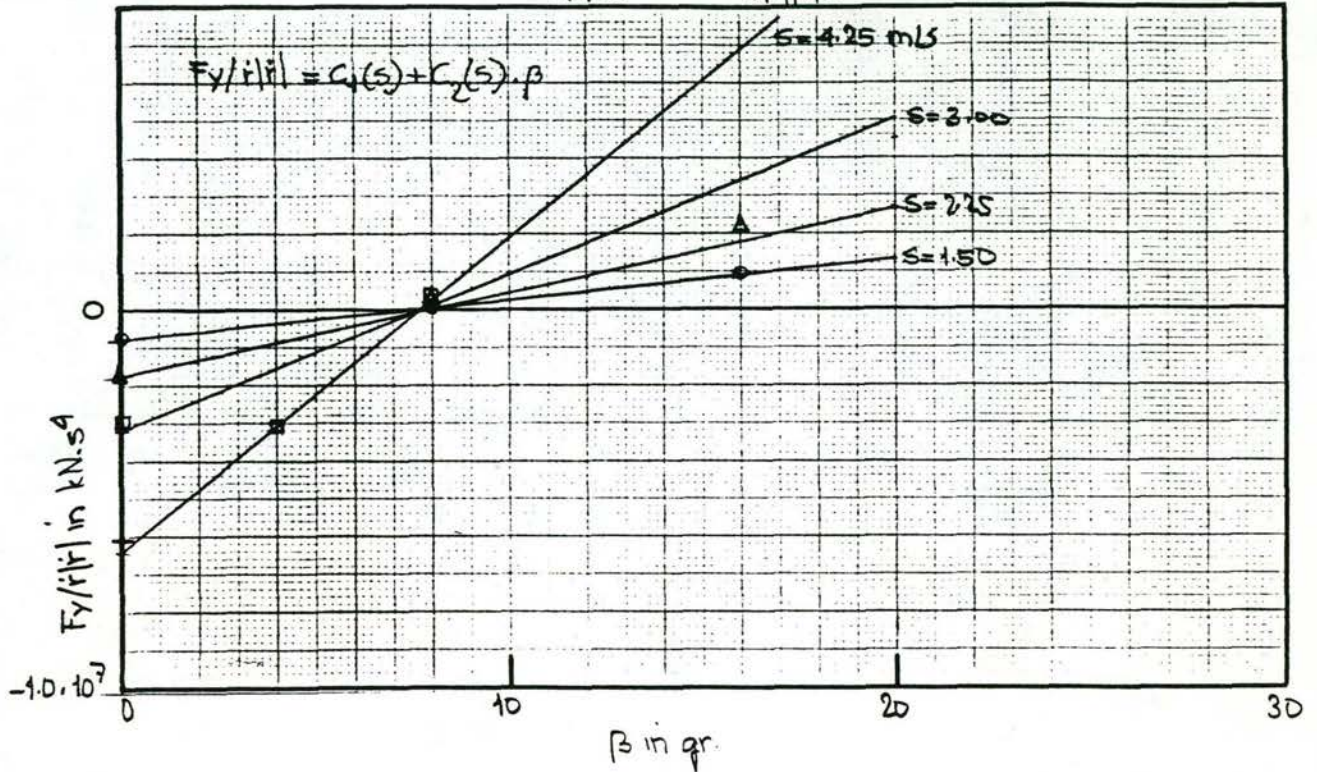
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$F_y(\dot{r}^2) = Y_{r|\dot{r}|ss} \cdot \dot{r}|\dot{r}|s^2 + Y_{r|\dot{r}|l\beta|ss} \cdot \dot{r}|\dot{r}|v \cdot s$$

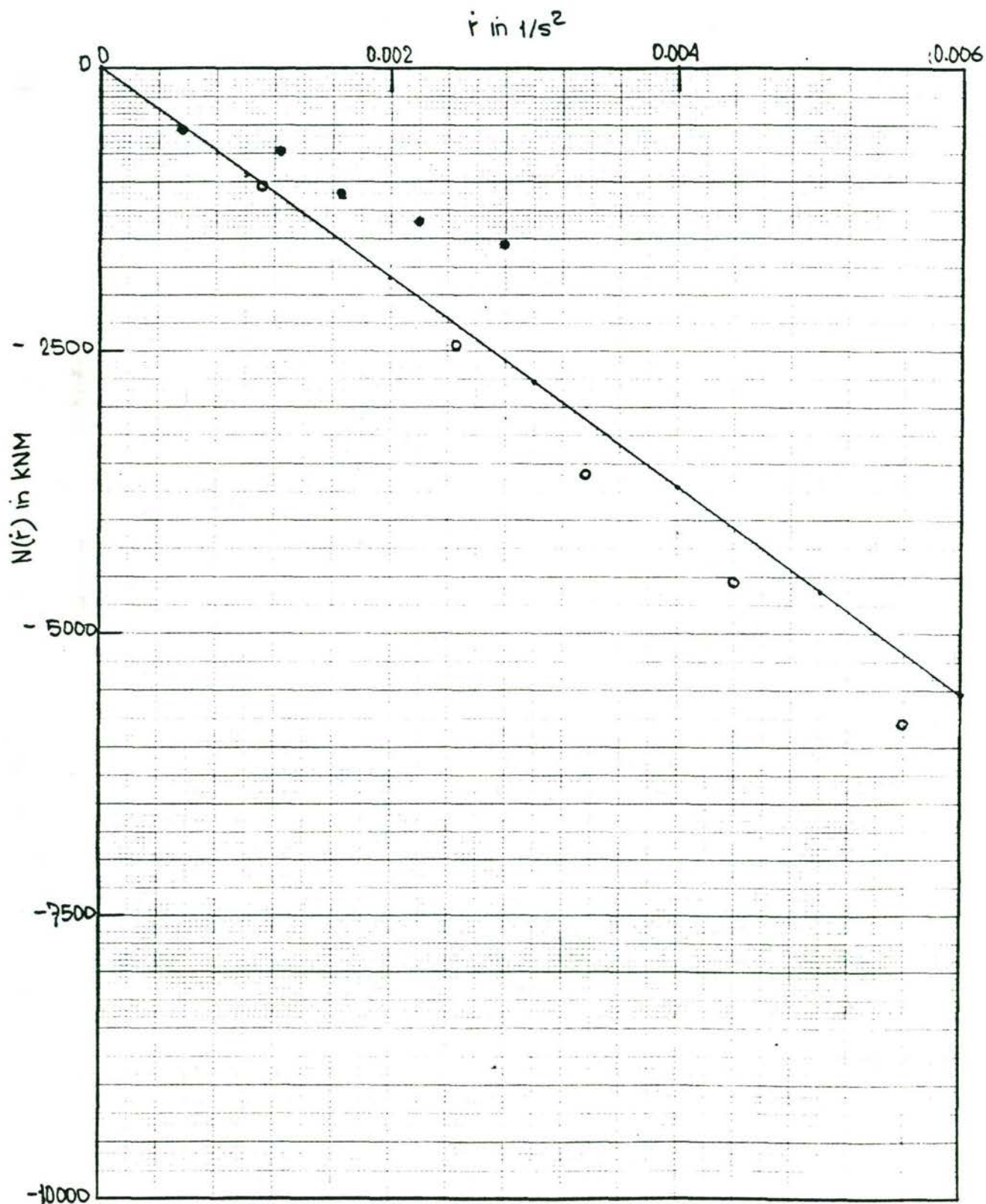
$$\hat{=} Y_{r|\dot{r}|u} \cdot \dot{r}|\dot{r}|u^2 + Y_{r|\dot{r}|v|u} \cdot \dot{r}|\dot{r}|v|u$$



DVK Projekt Windhinder
 rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

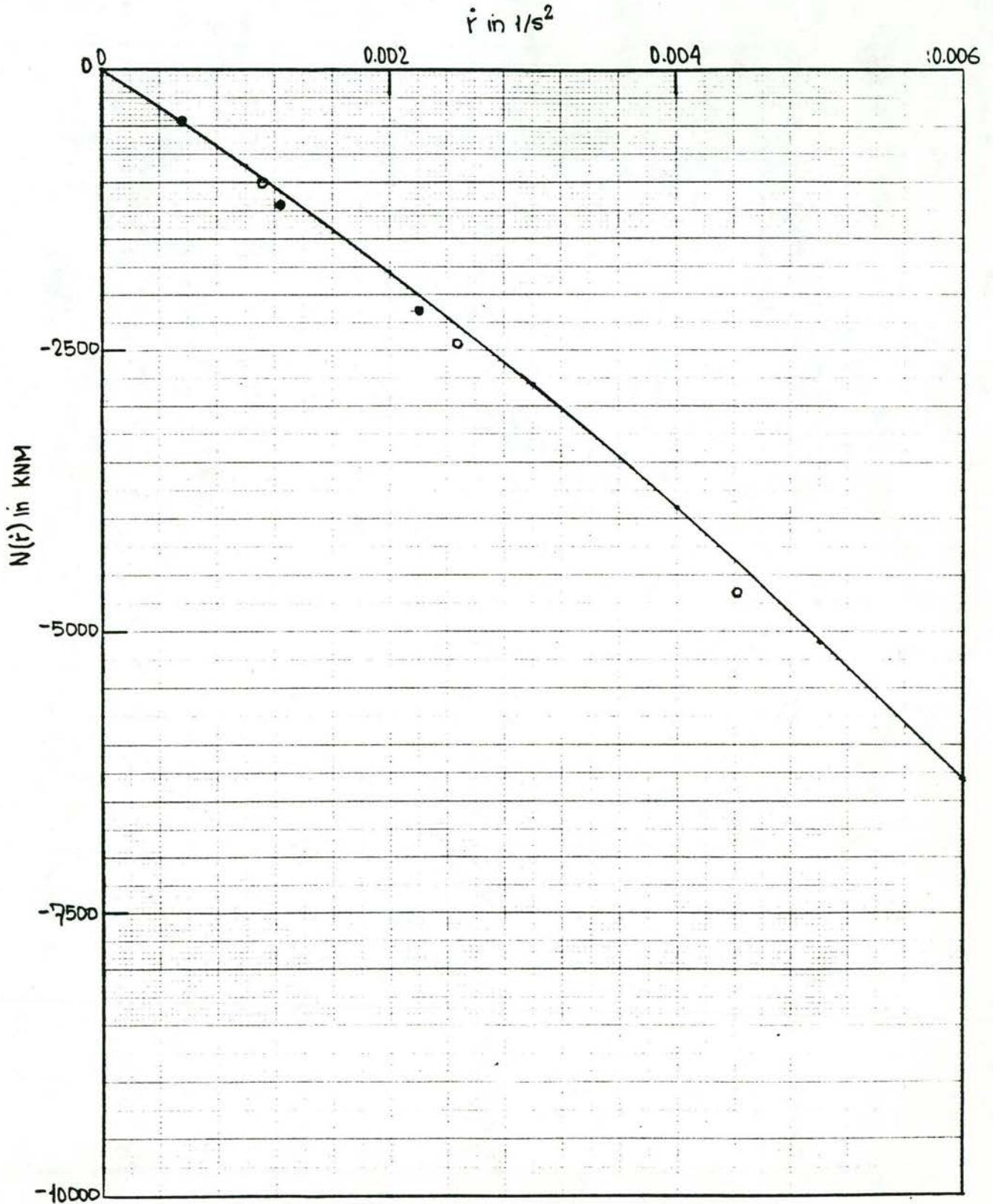
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

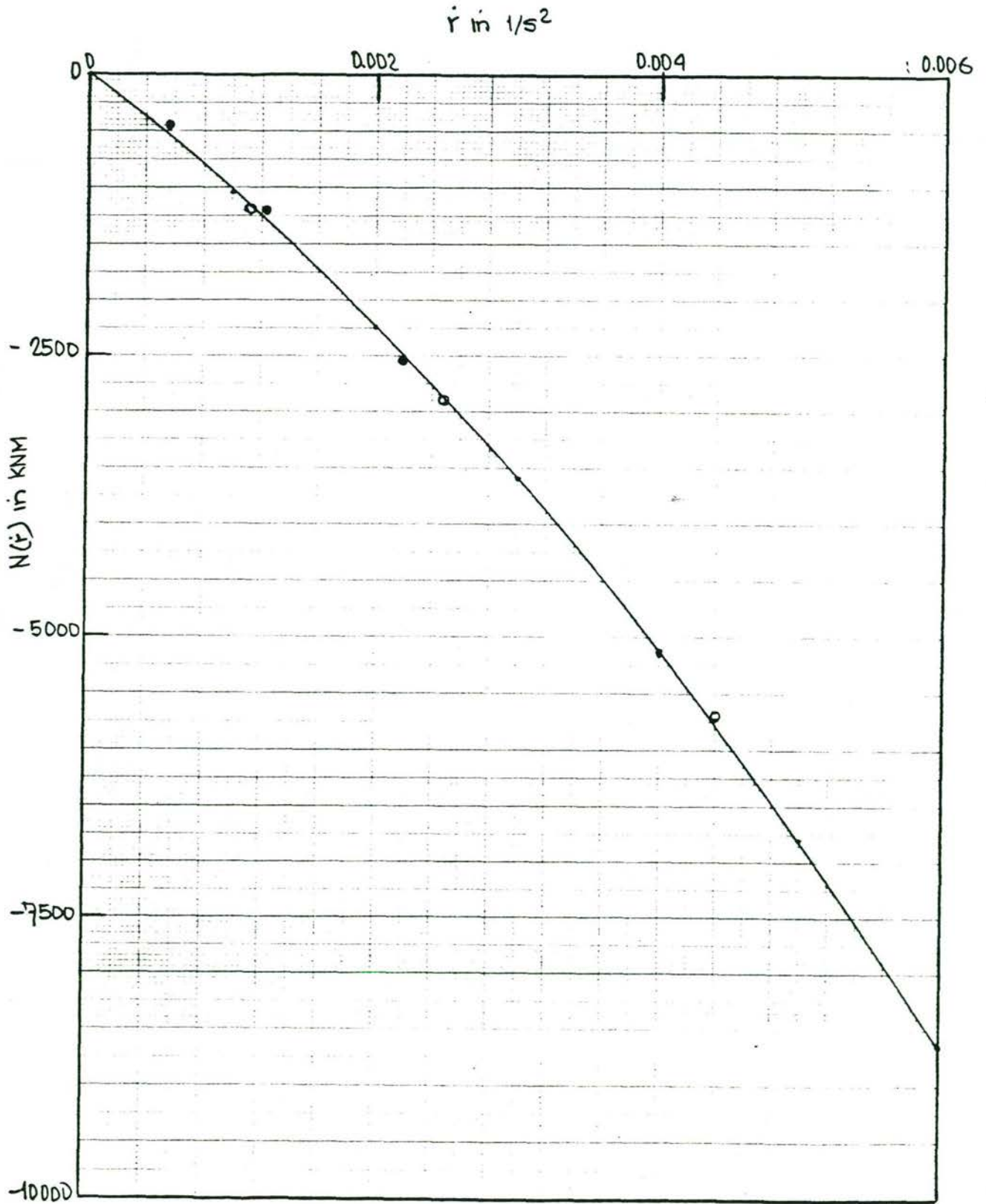
drifthoek : $B = 8$ deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 1.50 m/s)

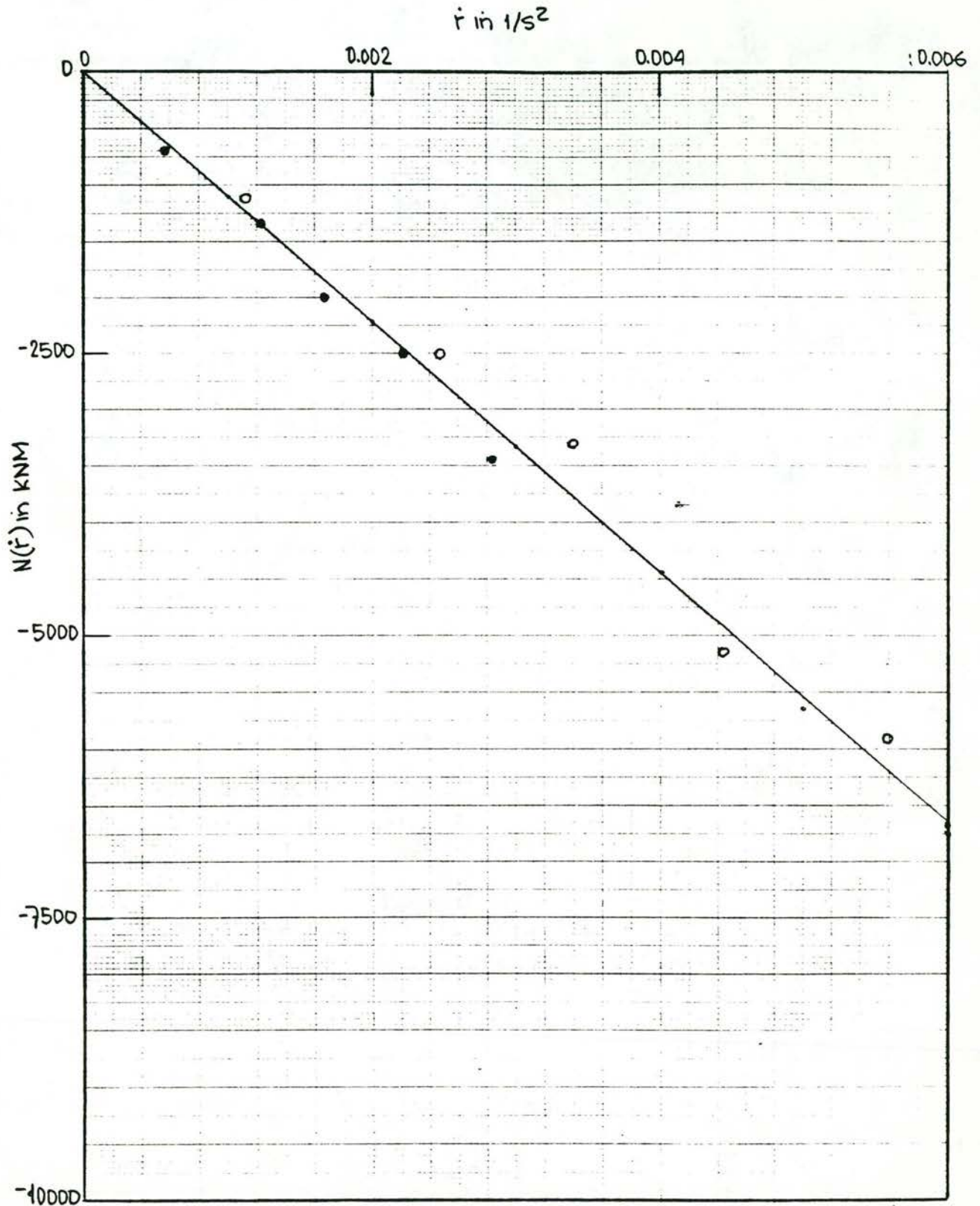
drifthoek : B= 16 deg
 amplitude 5.0 graden : o
 amplitude 10.0 graden : o



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

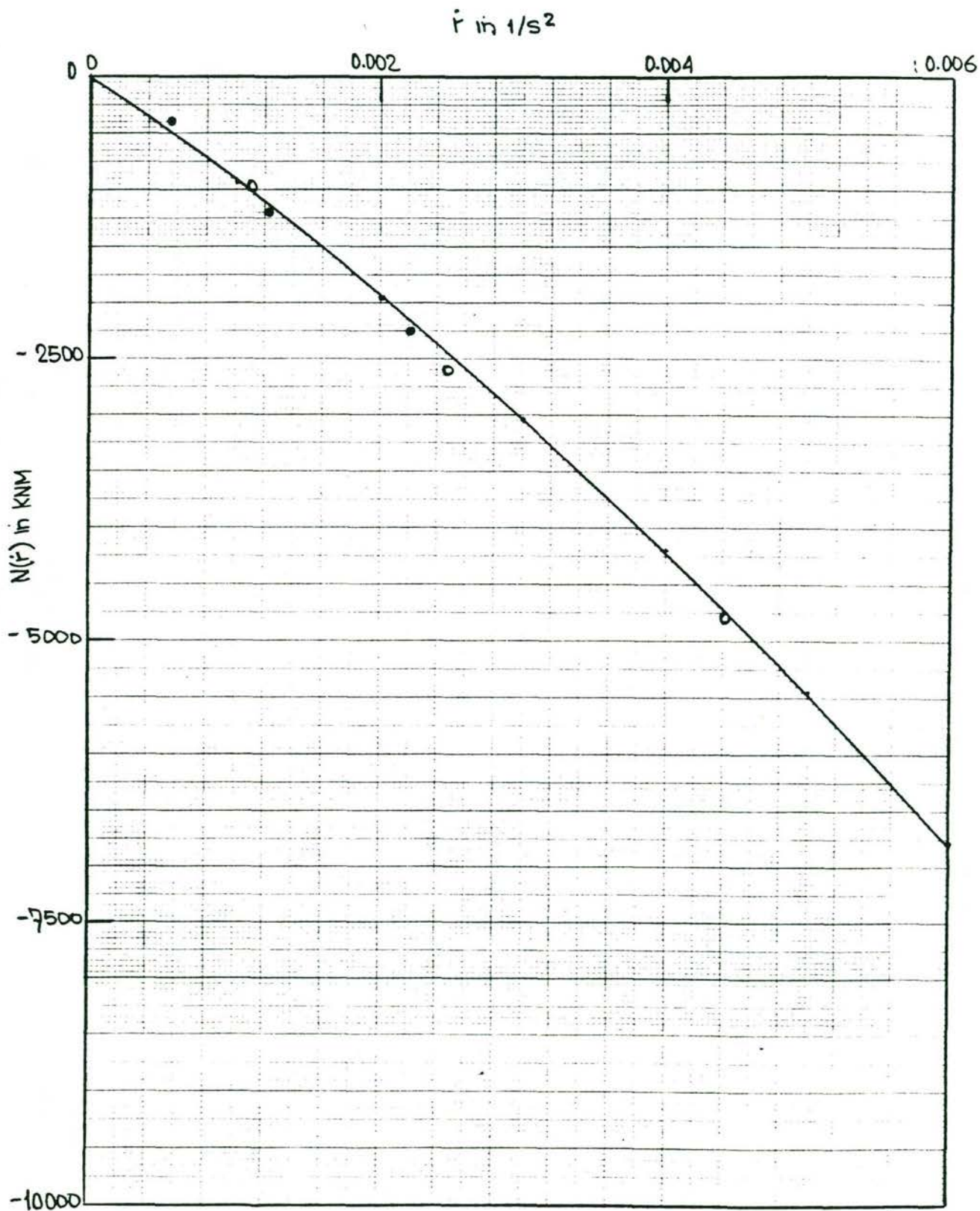
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

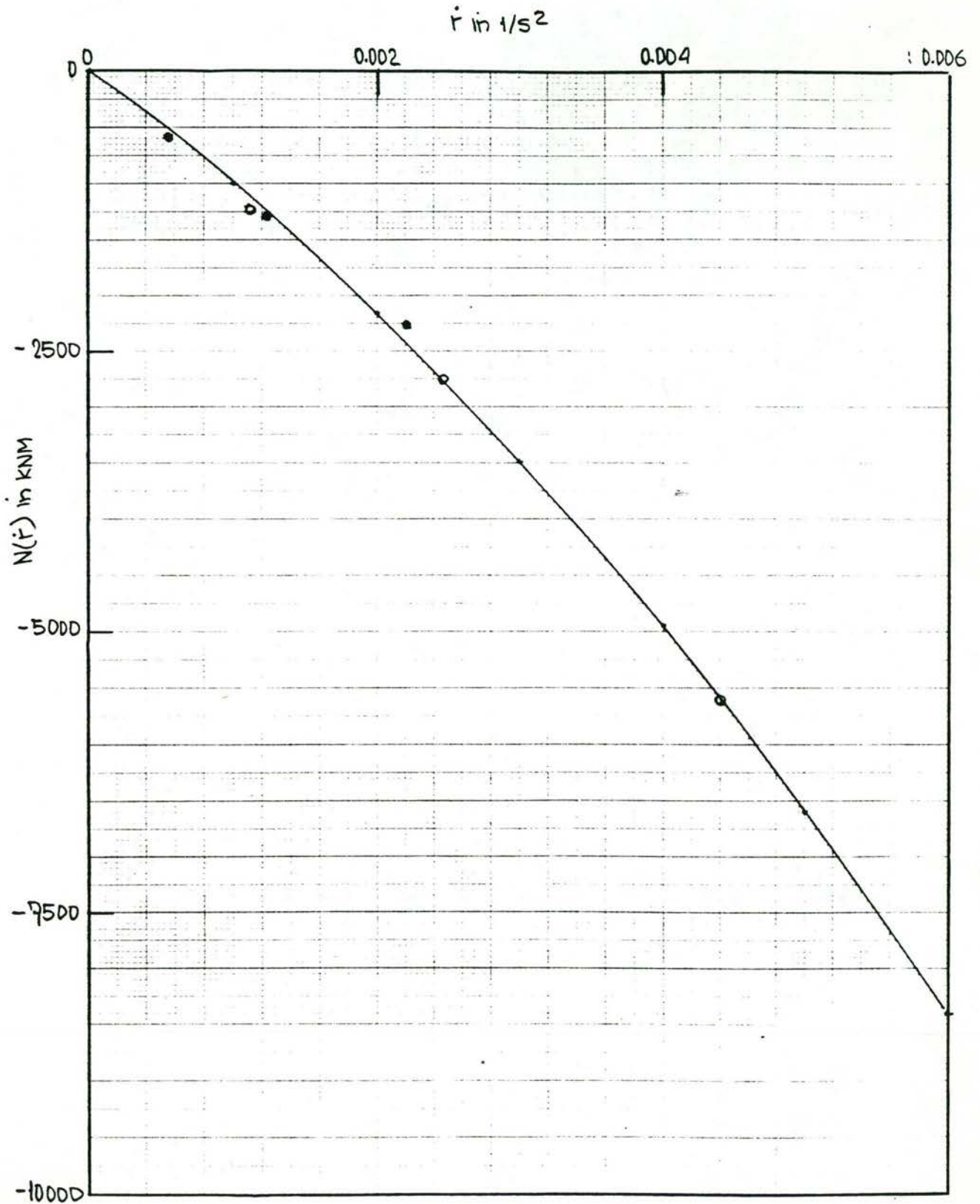
drifthoek : $B = 8$ deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

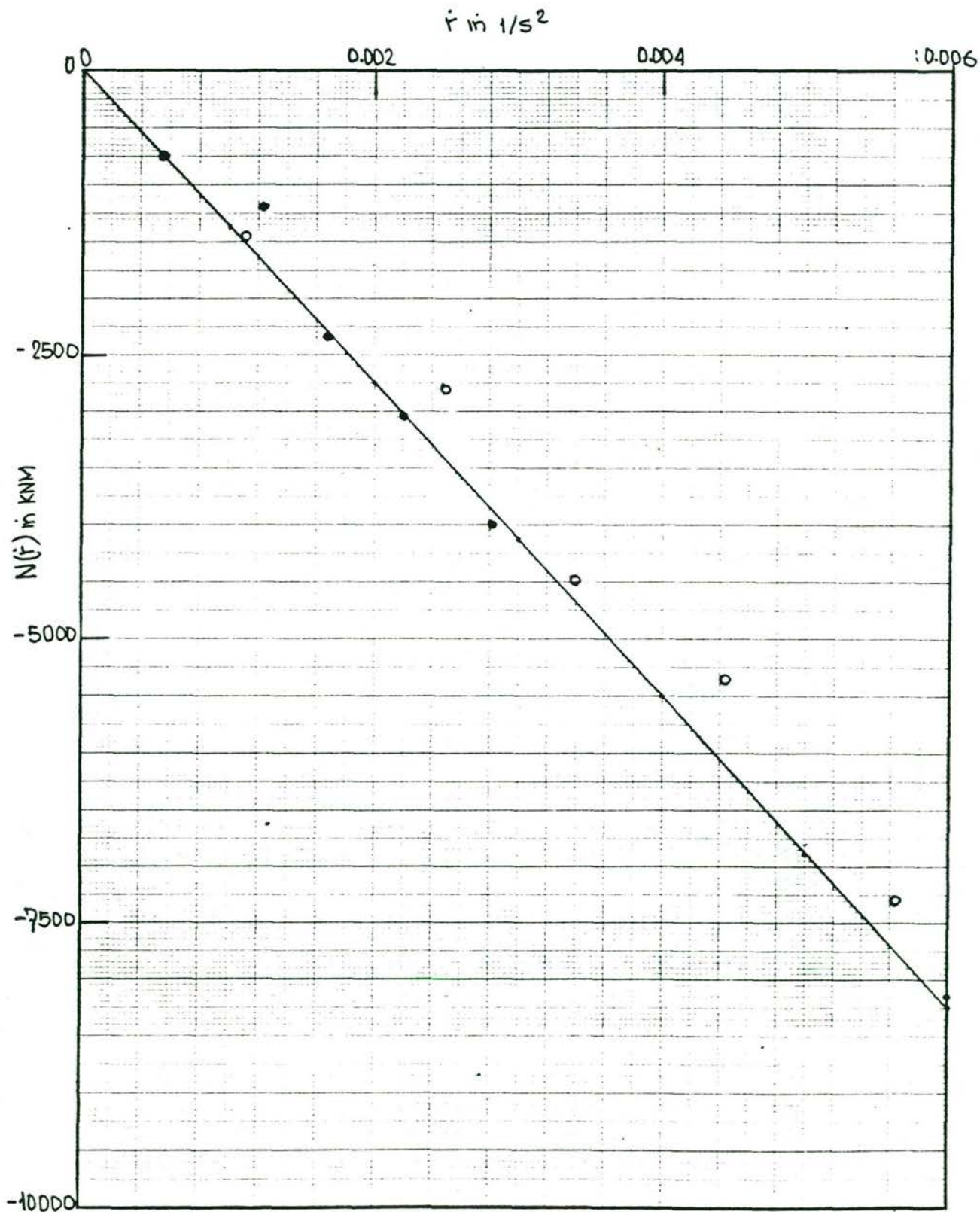
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 300 m/s)

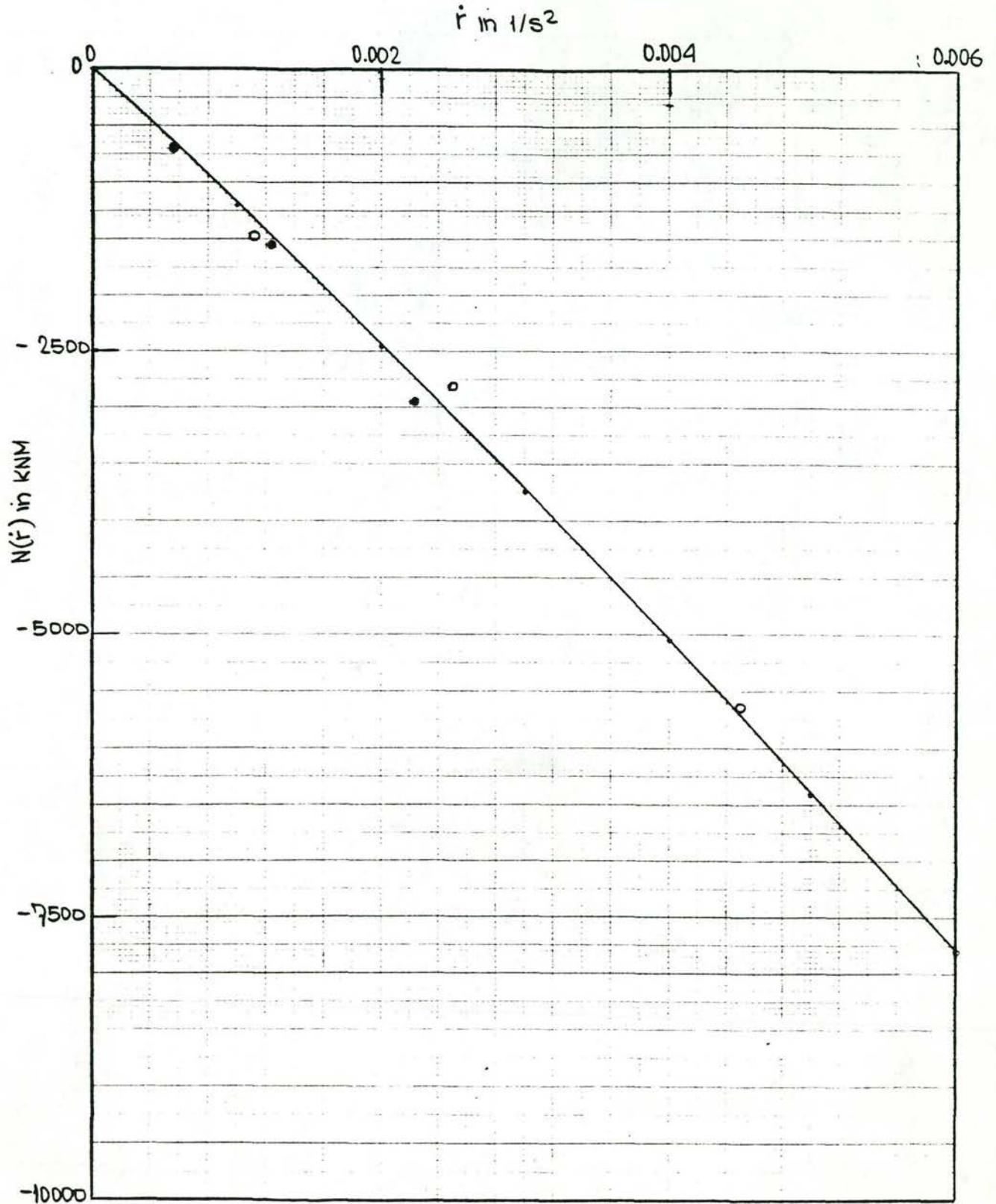
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

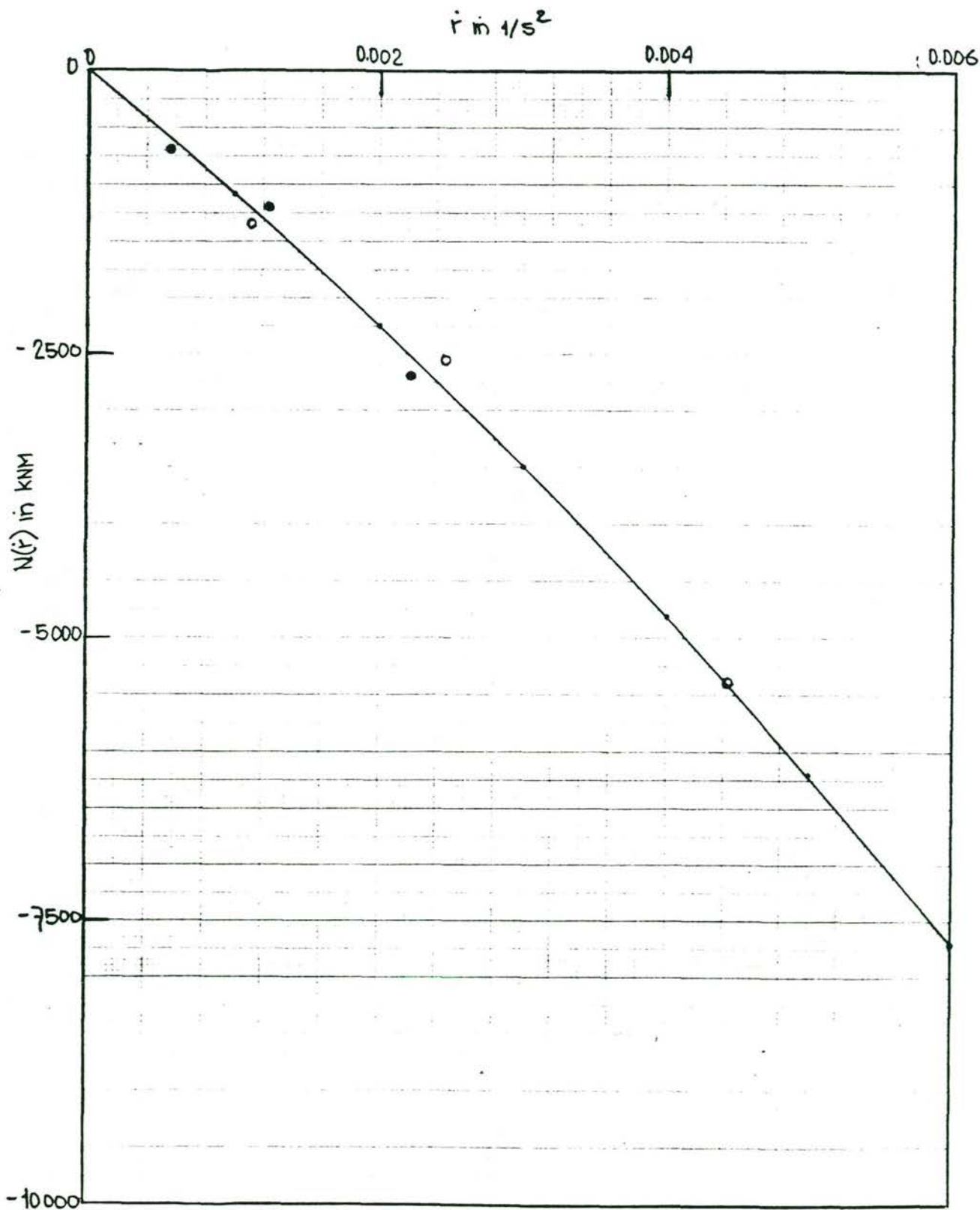
drifthoek : B= 4 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.00 m/s)

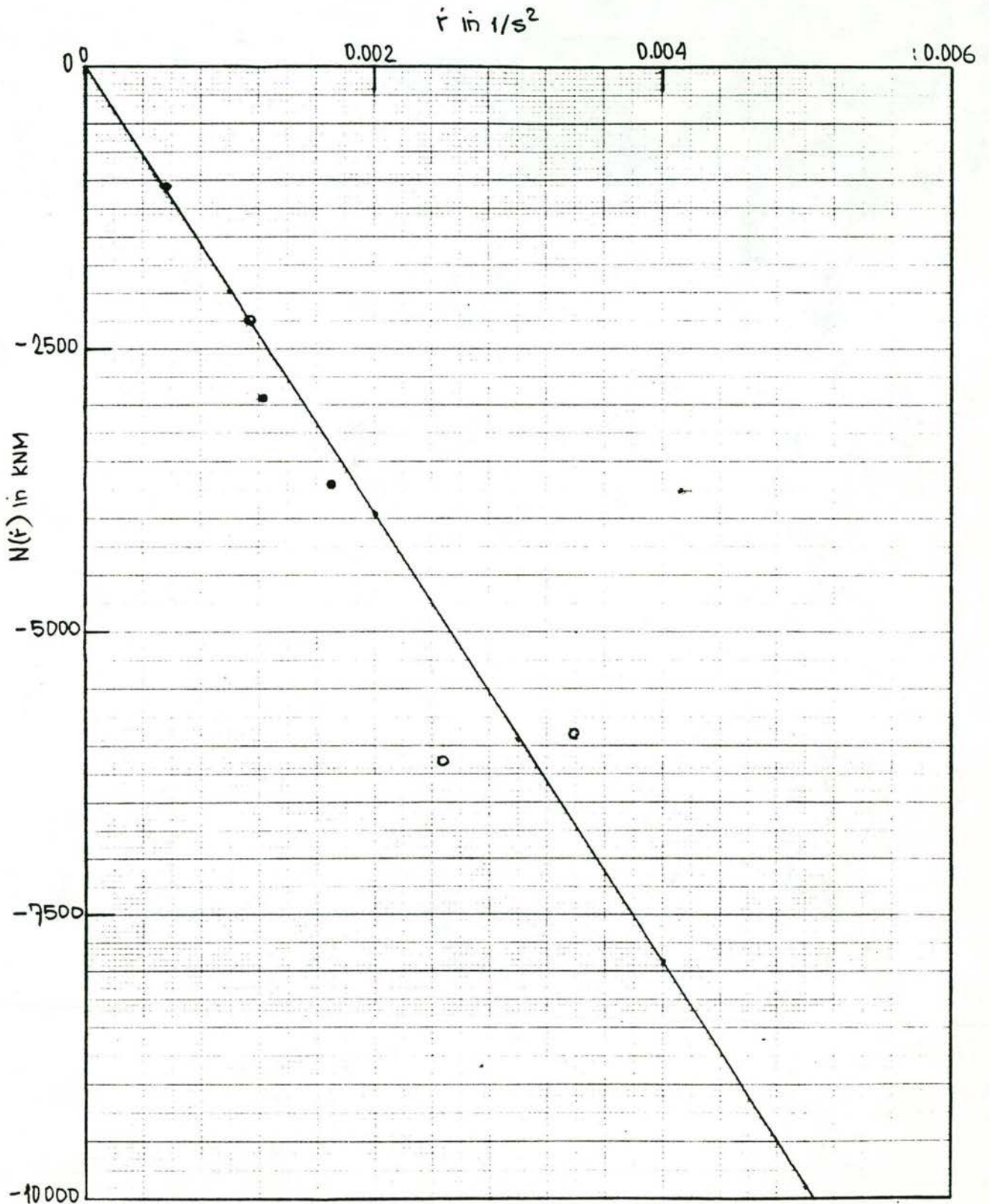
drifthoek : B= 8 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: beladen, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.25 m/s)

drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



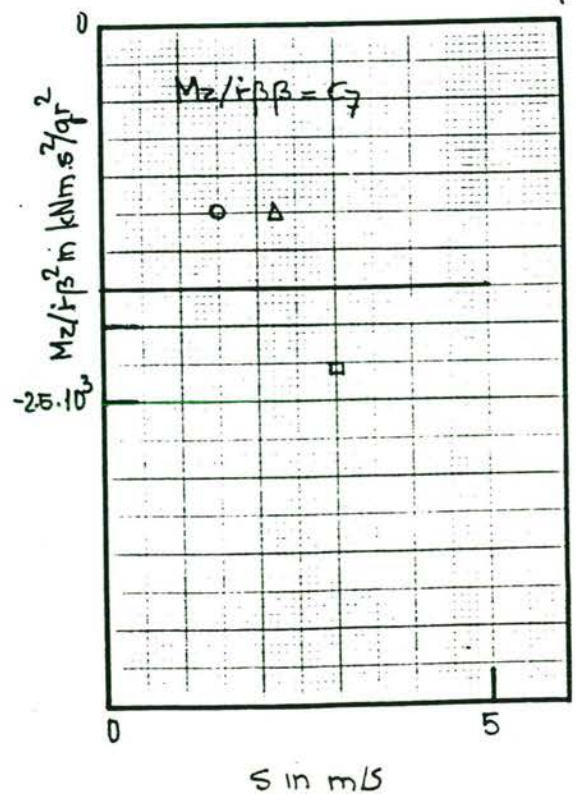
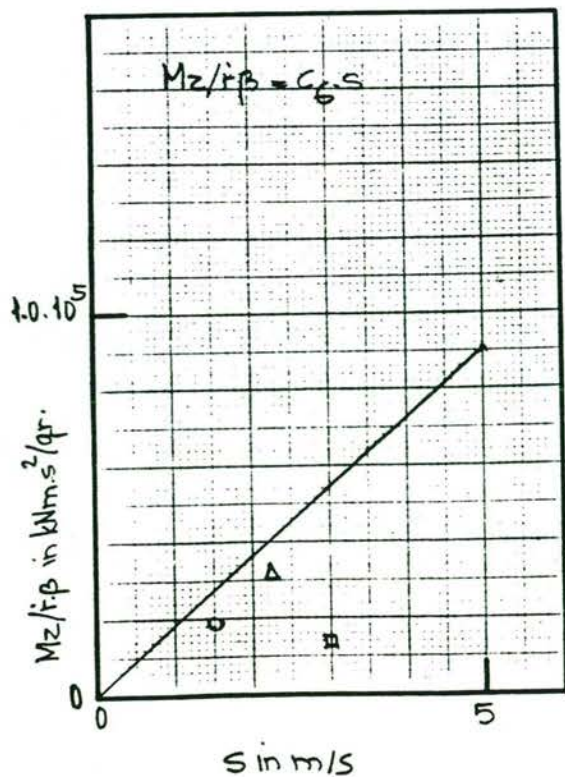
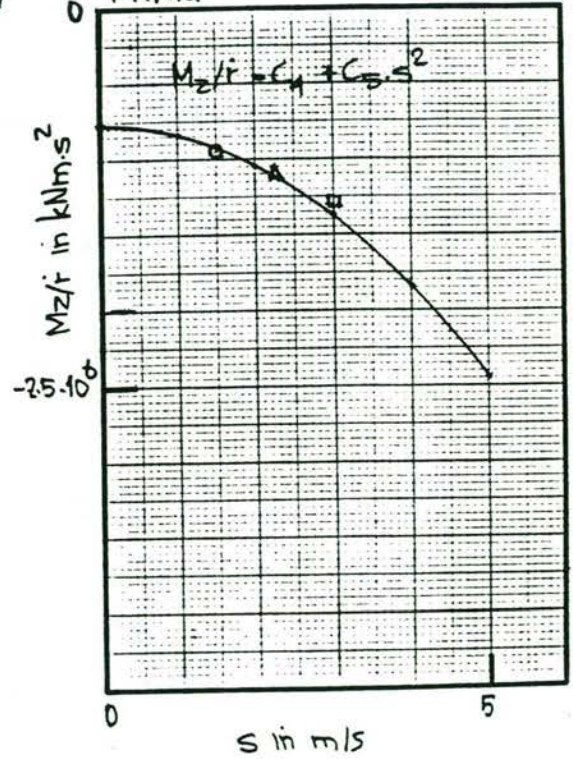
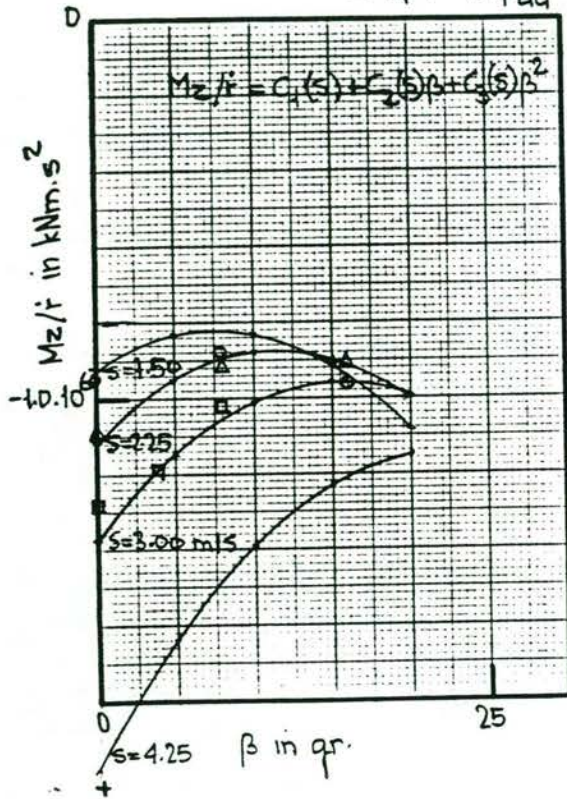
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$M_z(\dot{r}) = N_{\dot{r}} \cdot \dot{r} + N_{\dot{r}ss} \cdot \dot{r} s^2 + N_{\dot{r}\beta s} \cdot \dot{r} \beta s + N_{\dot{r}\beta^2} \cdot \dot{r} \beta^2$$

$$\hat{=} N_{\dot{r}} \cdot \dot{r} + N_{\dot{r}uu} \cdot \dot{r} u^2 + N_{\dot{r}v} \cdot \dot{r} v + N_{\dot{r}vw/uu} \cdot \dot{r} \cdot w/uu$$



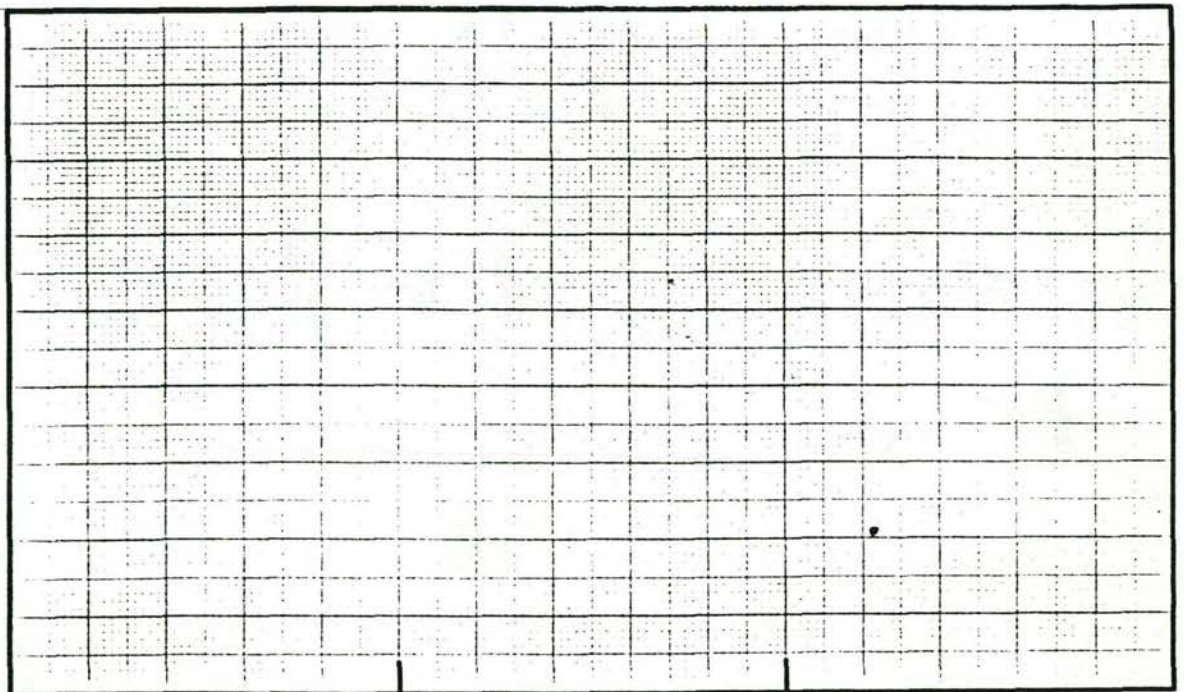
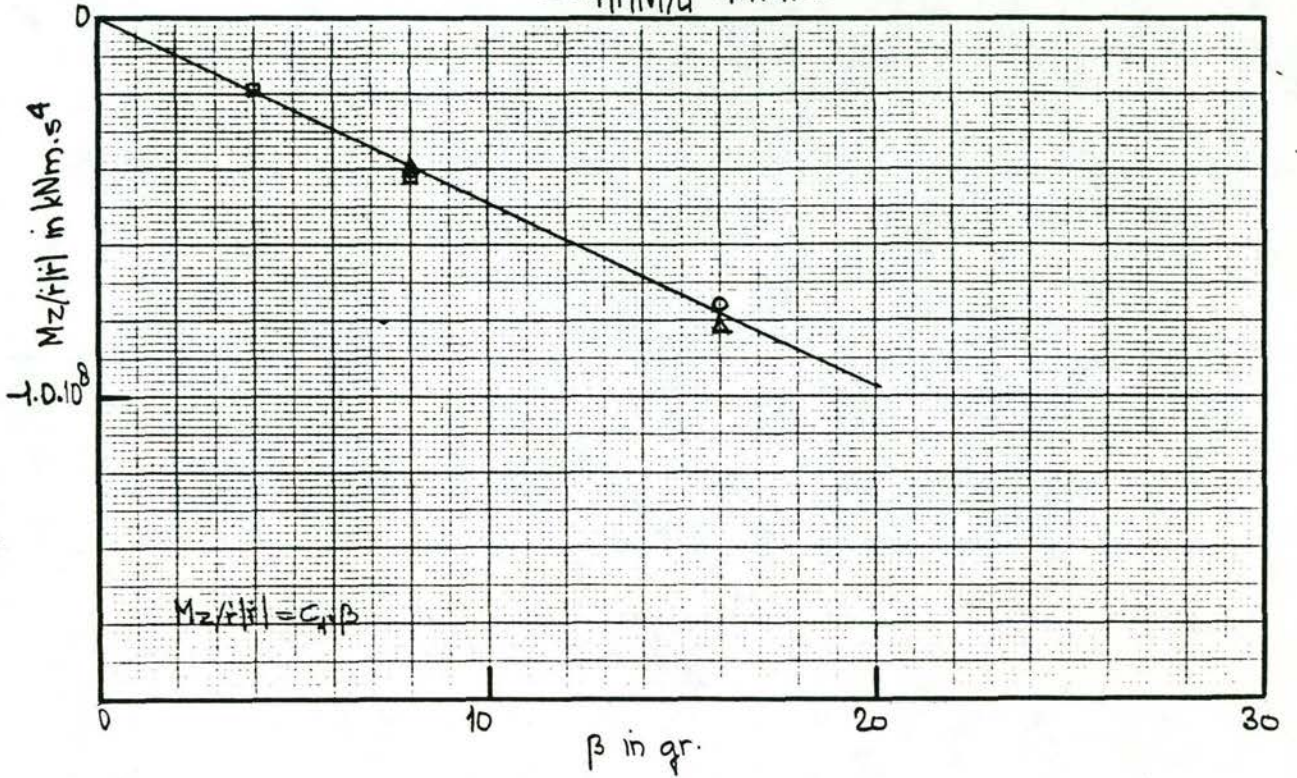
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip beladen, breed water

$$M_z(r|\dot{r}) = N_{r|\dot{r}|\beta} \cdot r|\dot{r} \cdot \beta$$

$$\hat{=} N_{r|\dot{r}||v|/u} \cdot r|\dot{r}||v|/u$$



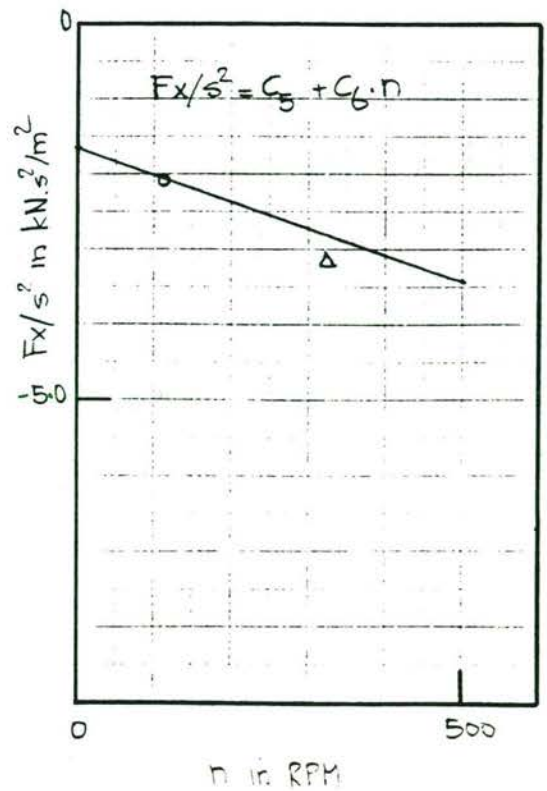
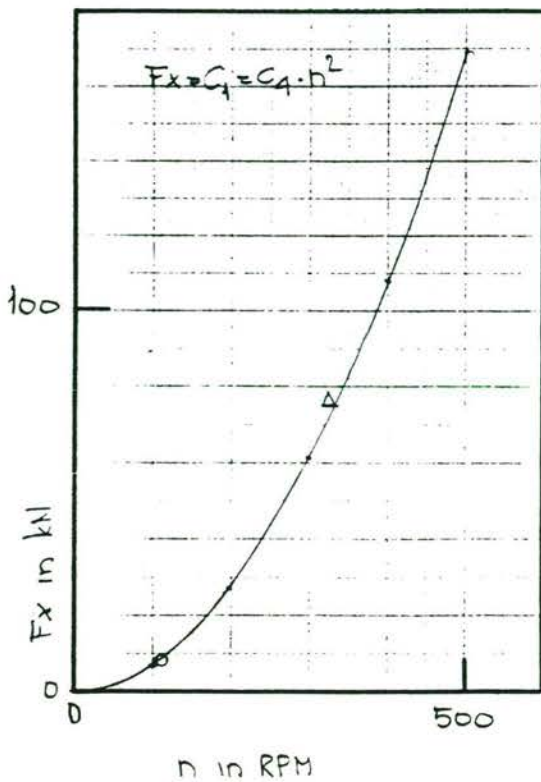
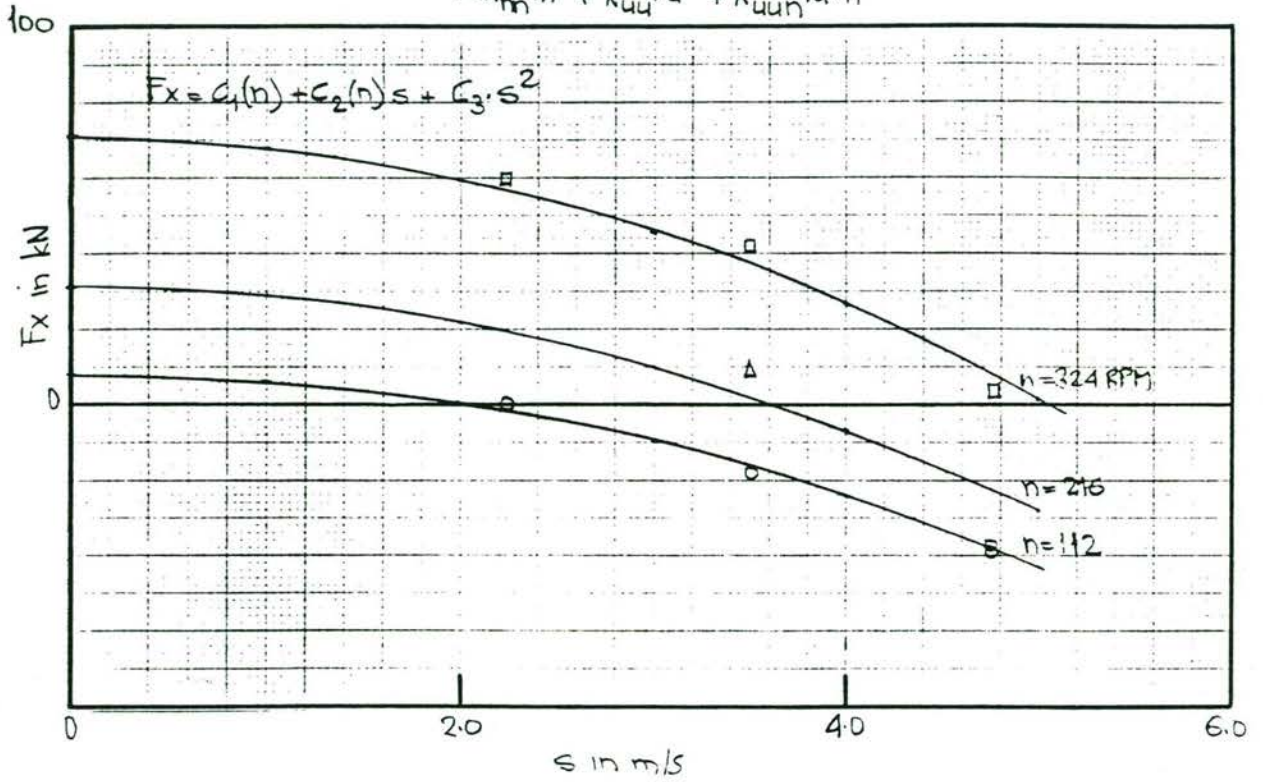
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast breed water

$$F_x(\beta=0, \delta=0) = X_{mm} \cdot n^2 + X_{ss} \cdot s^2 + X_{ssn} \cdot s^2 \cdot n$$

$$\hat{=} X_m \cdot n^2 + X_{uu} \cdot u^2 + X_{uun} \cdot u^2 \cdot n$$

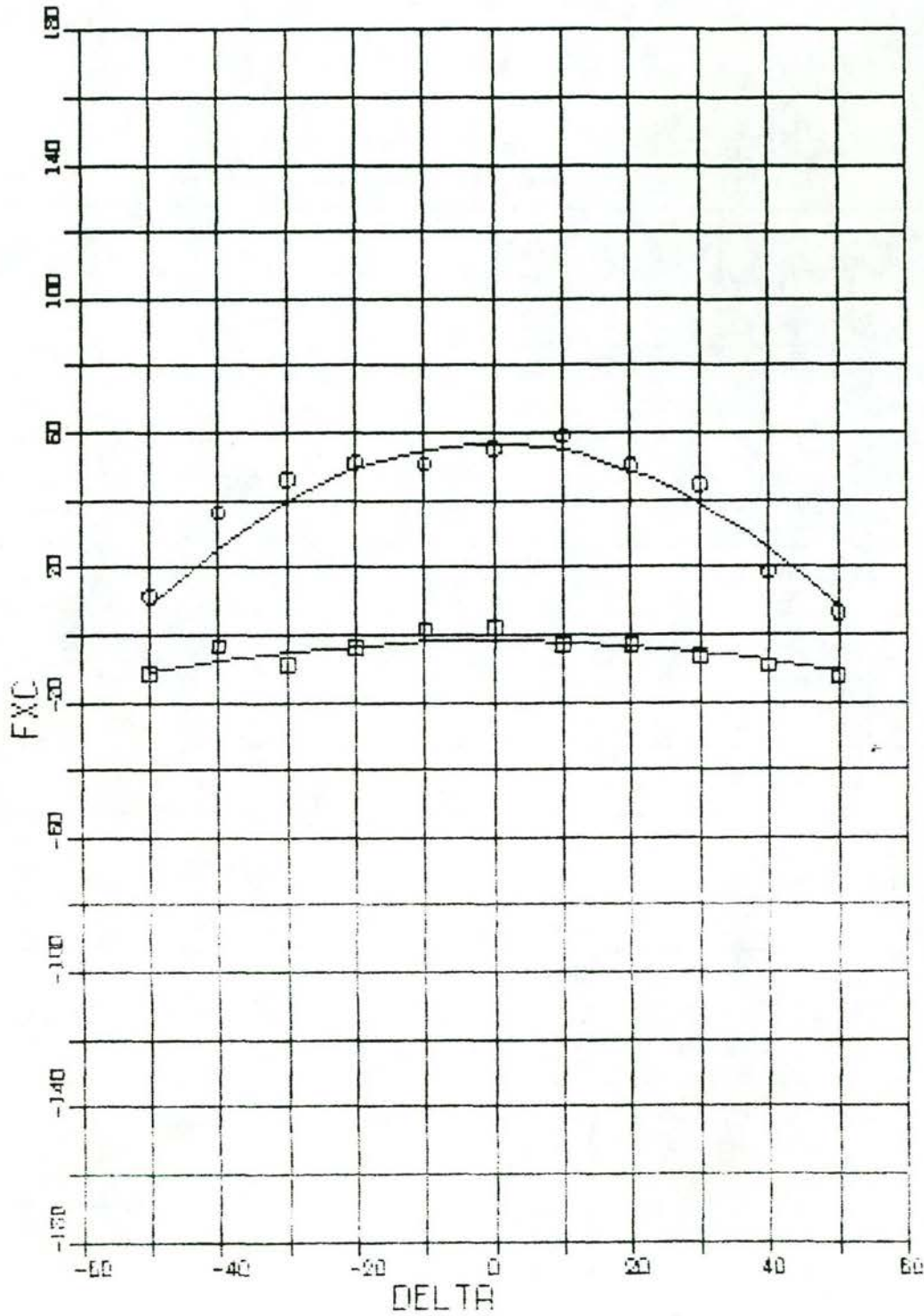


DVK Projekt Windhinder

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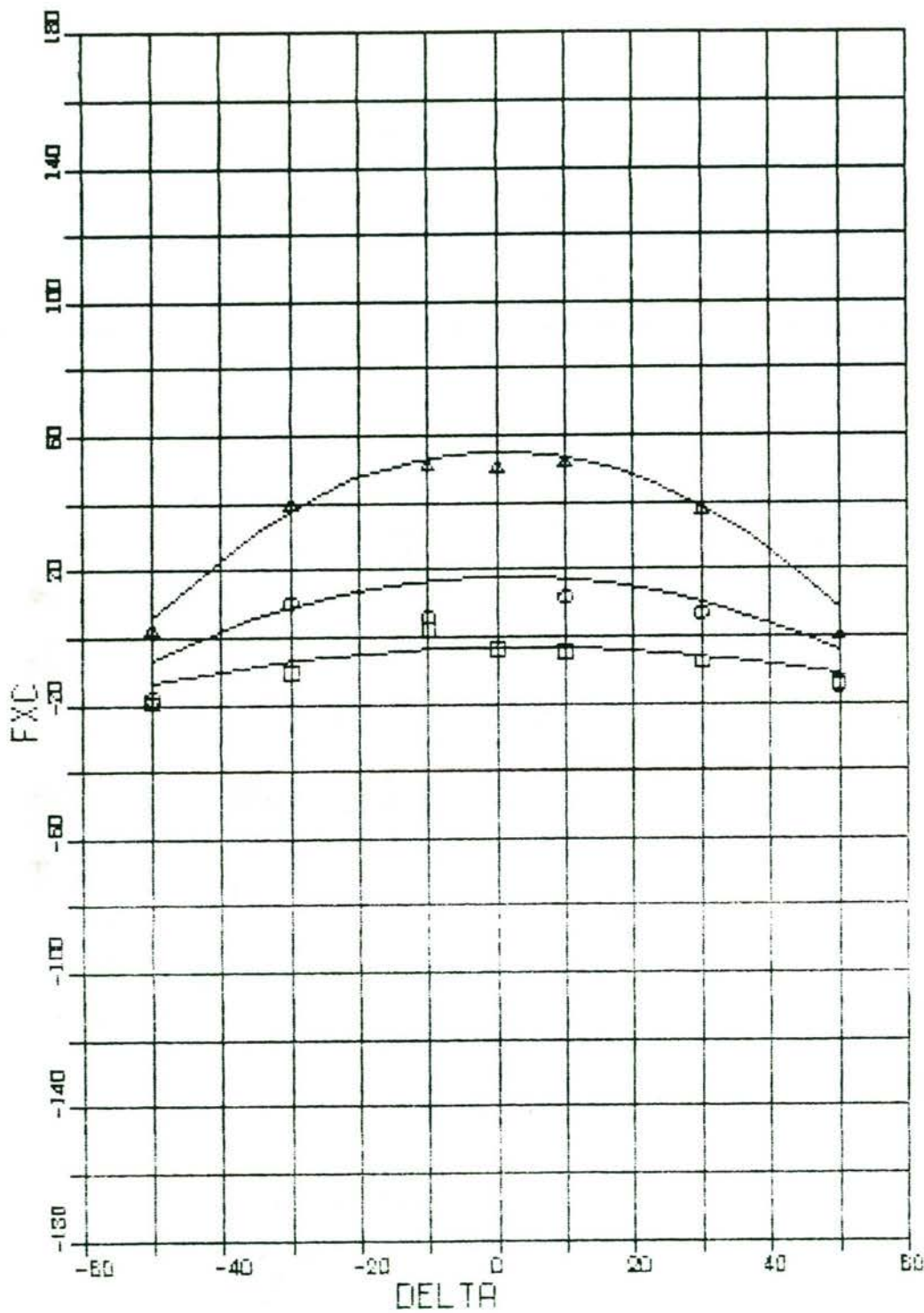
CONS S 2.2500

CONS BETR .0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,UI,DDNN,DDUU,DU,VV)



DVK Projekt Windhinder

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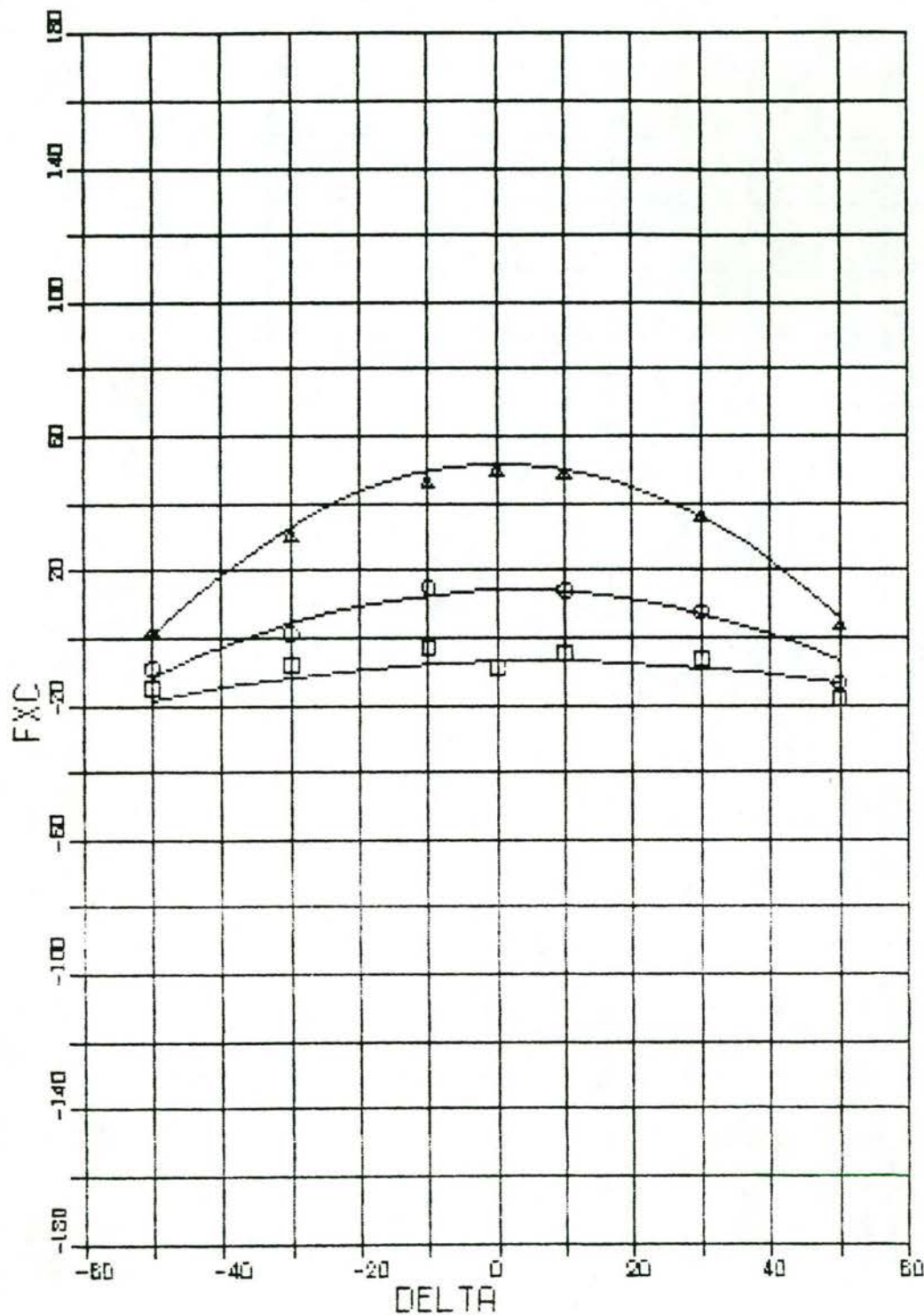
COND 8 2.2500

COND BETA 8.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NDU,NN,OU,DDNN,DDUU,DV,MV)



DVK Projekt Windhinder

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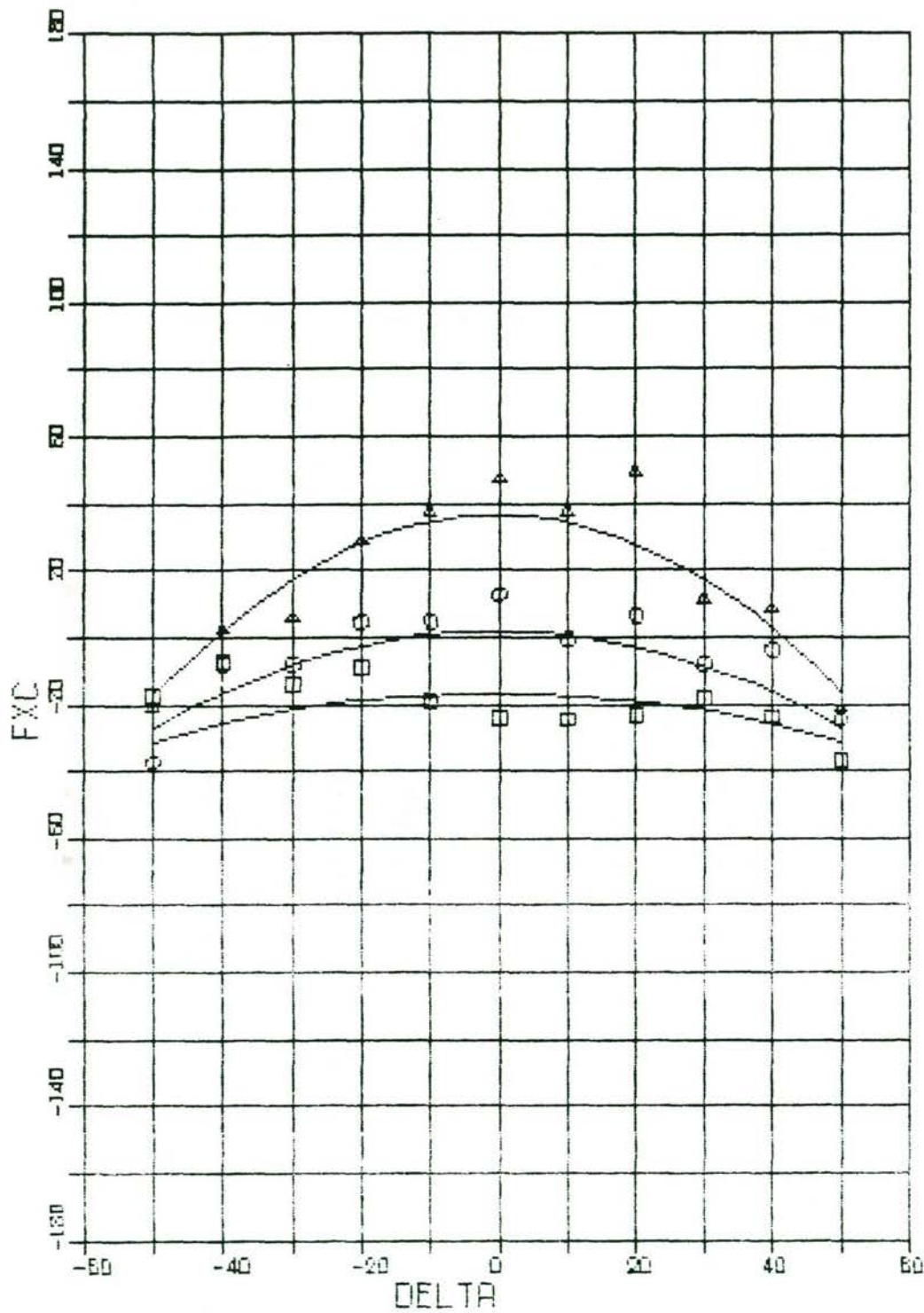
CONS S 2.2500

CONS BETA 16.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,UU,DDNN,DDUU,DV,VV)



DVK Projekt Windhinder

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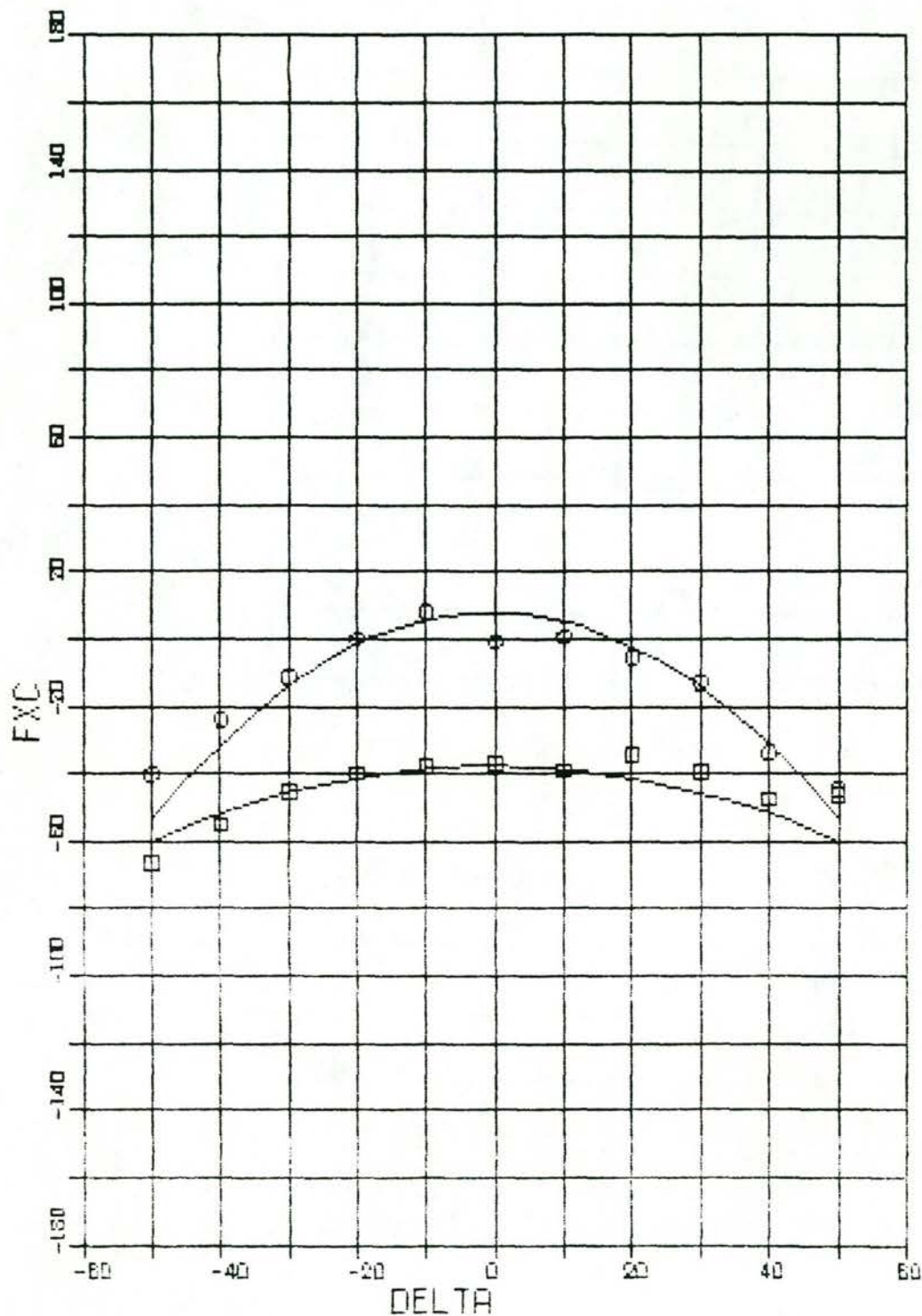
CONS S 3.5000

CONS BETA .0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F UNDU,NN,UB,DOWN,DOOU,DV,WV



DVK Projekt Windhinder

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CONS 8 4.7500

CONS BETA .0000

RIJN-HEERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,UU,DD,RI,DOUJ,DV,VV)

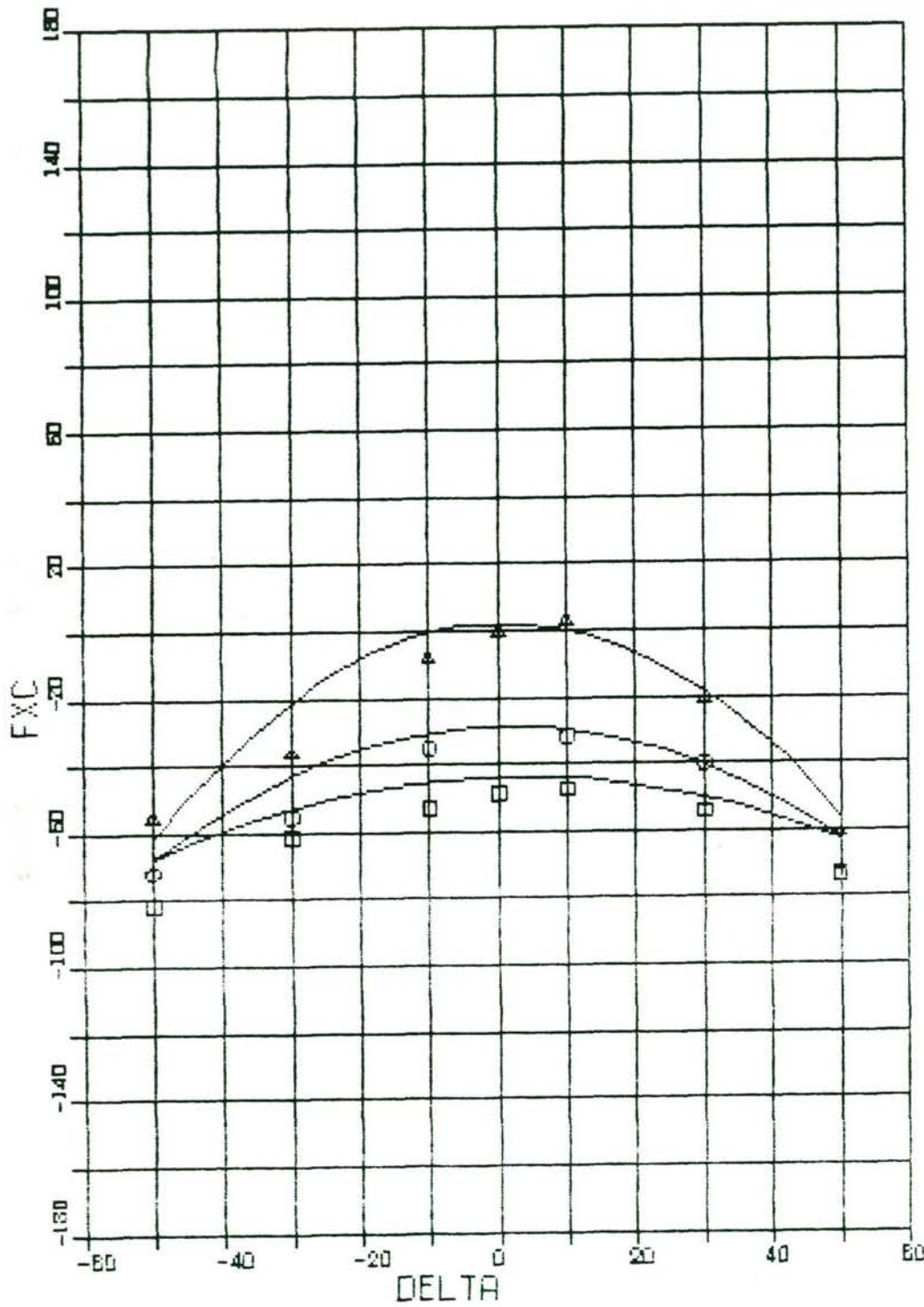
DVK Projekt Windhinder

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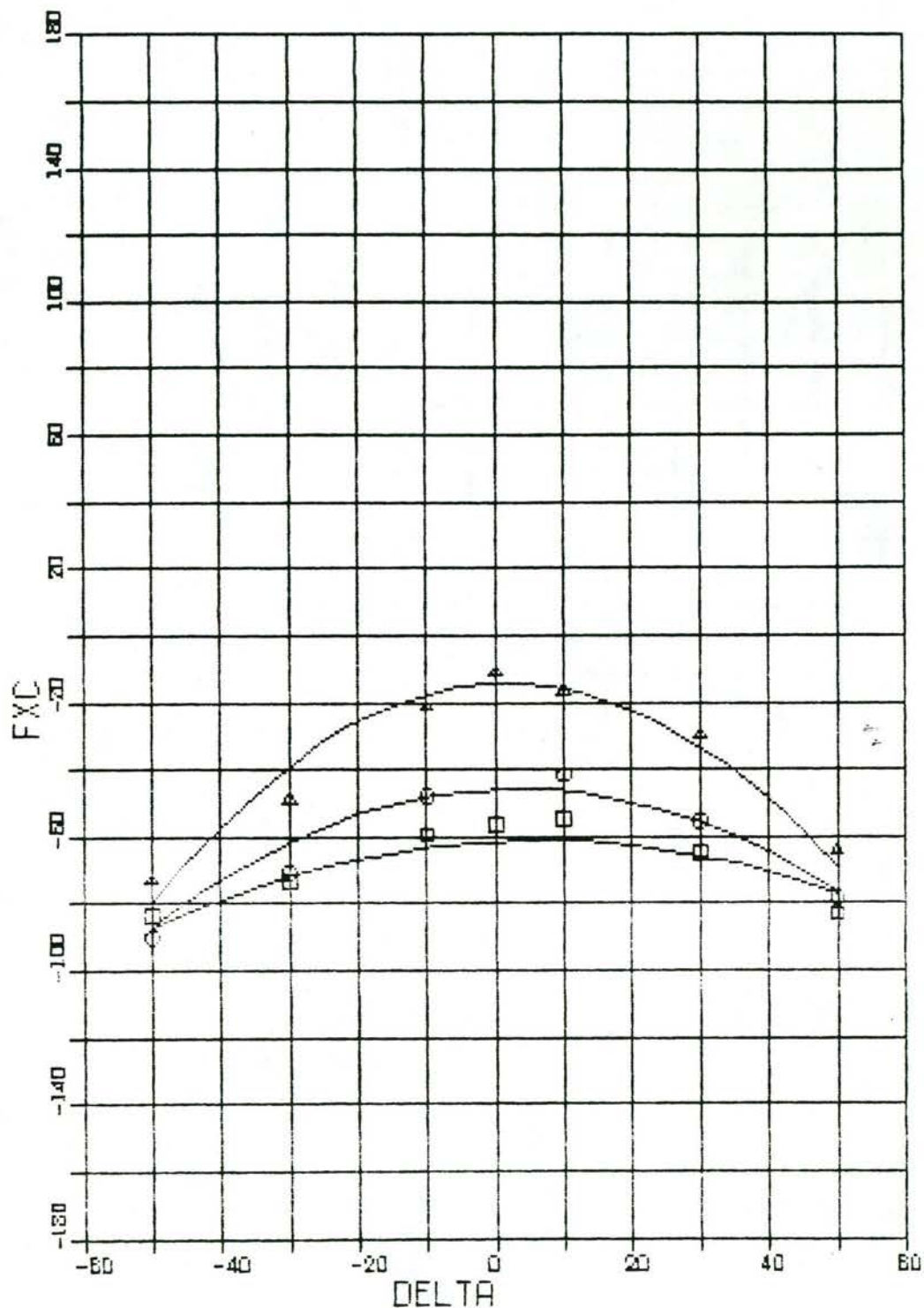
CONS 8 4.7500

CONS BETA 8.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,UU,DDNN,DDUU,DV,VV)



DVK Projekt Windhinder

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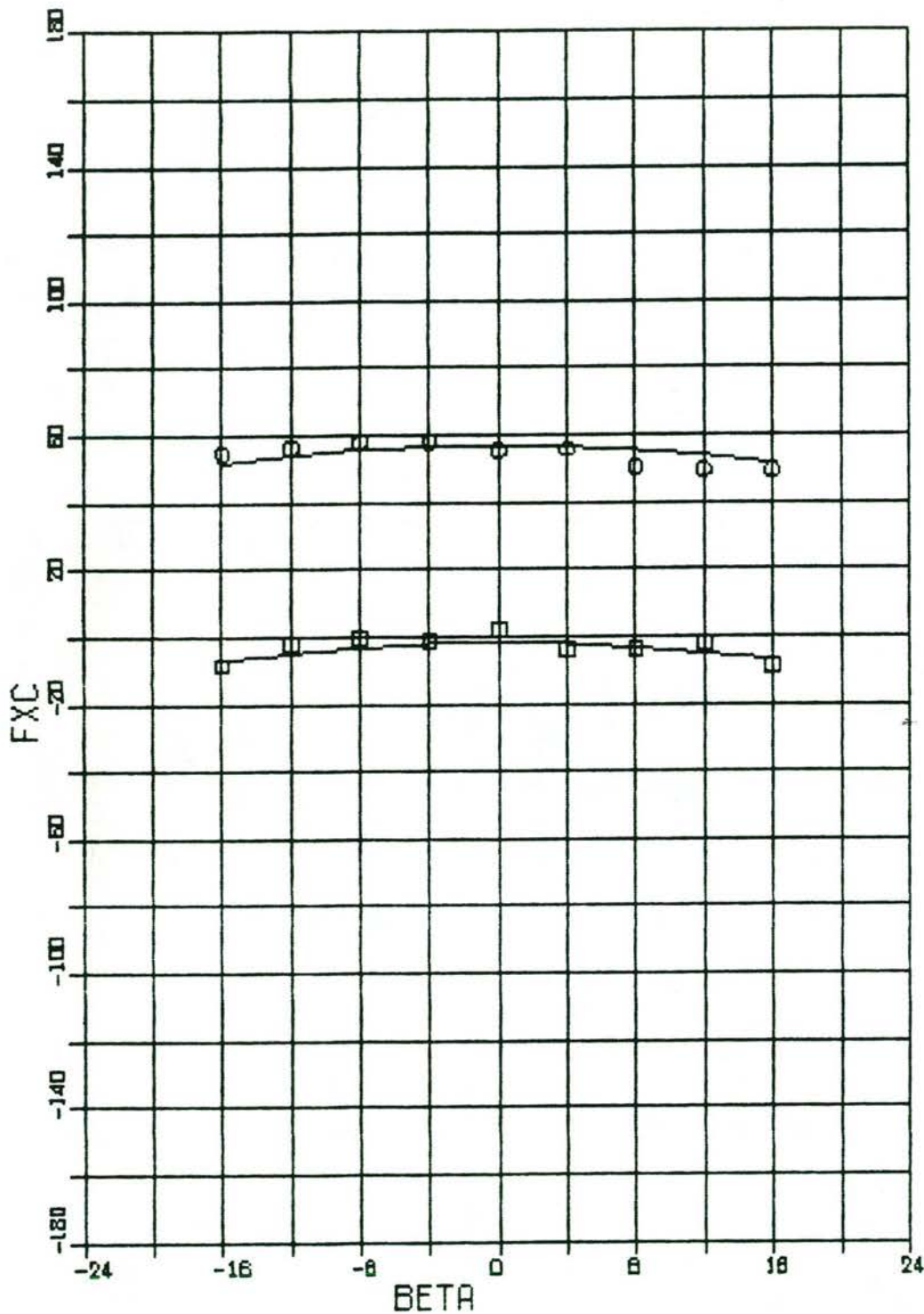
CONS S 4.7500

CONS BETA 16.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,LU,DDNN,DDUU,DV,VV)



DVK Projekt Windhinder

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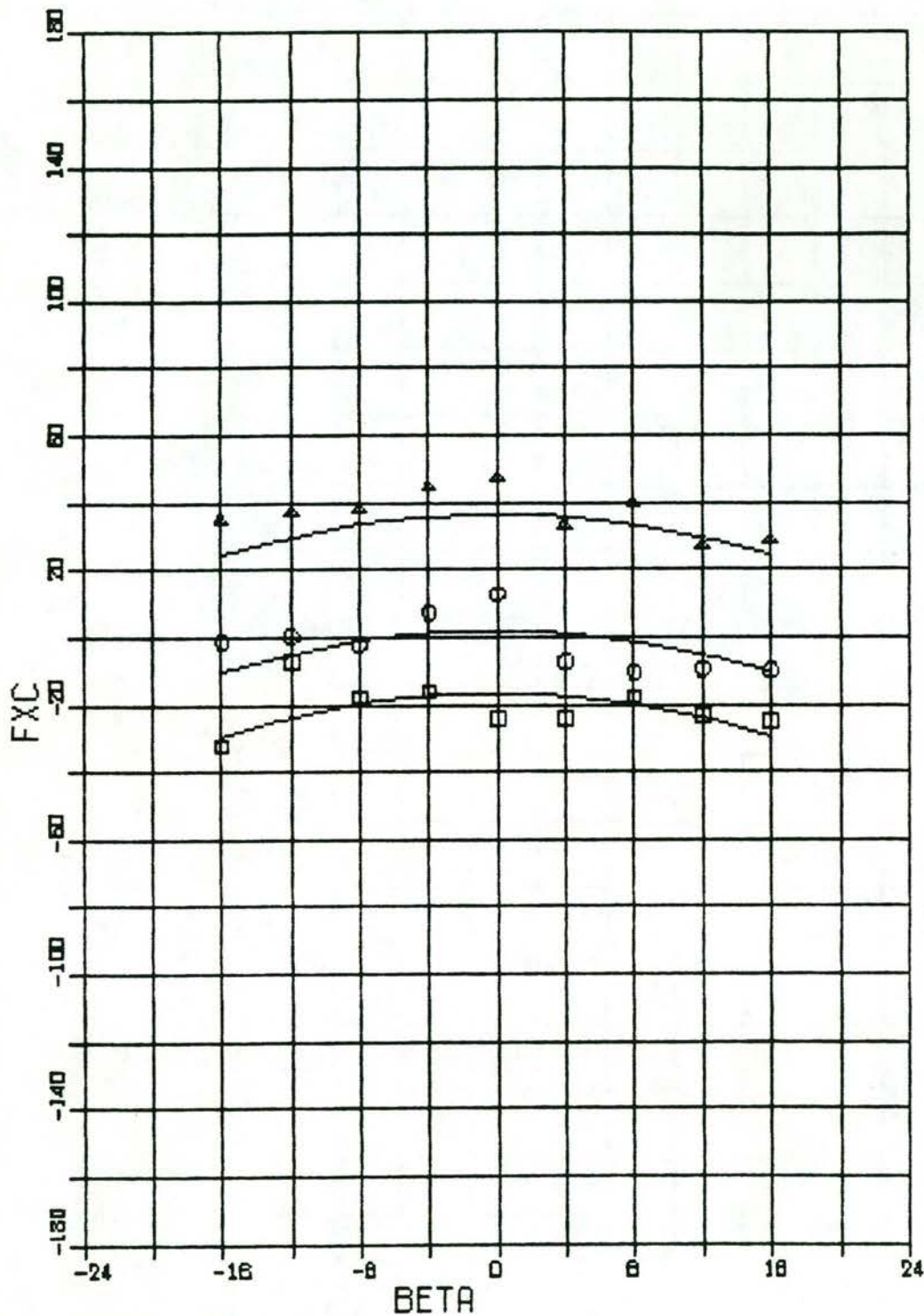
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CONS S 2.2500

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU, NN, UU, DDNN, DDUU, DV, VV)



DVK Projekt Windhinder

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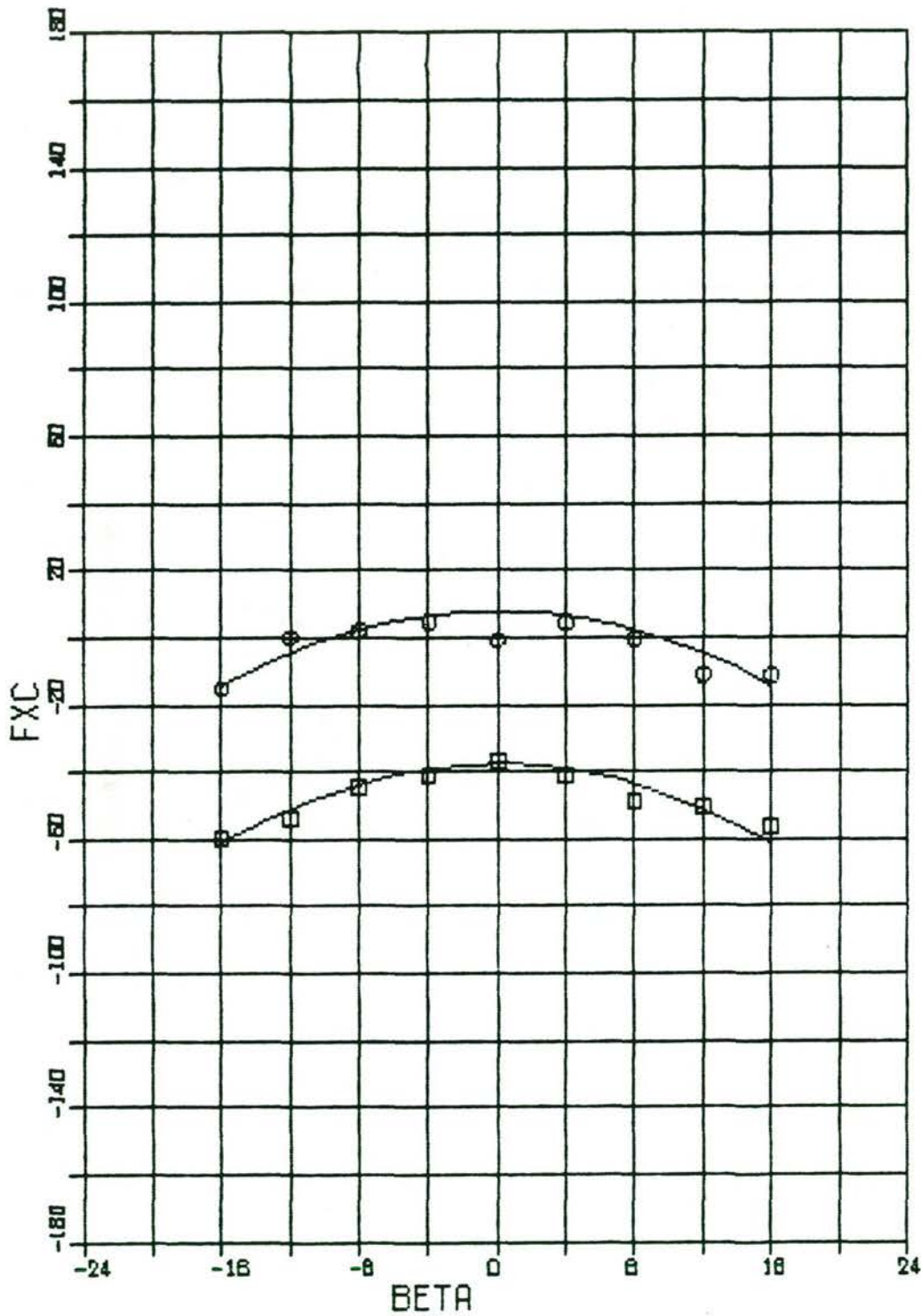
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CONS S 3.5000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU, NN, UU, DDNN, DDUU, DV, VV)



DVK Projekt Windhinder

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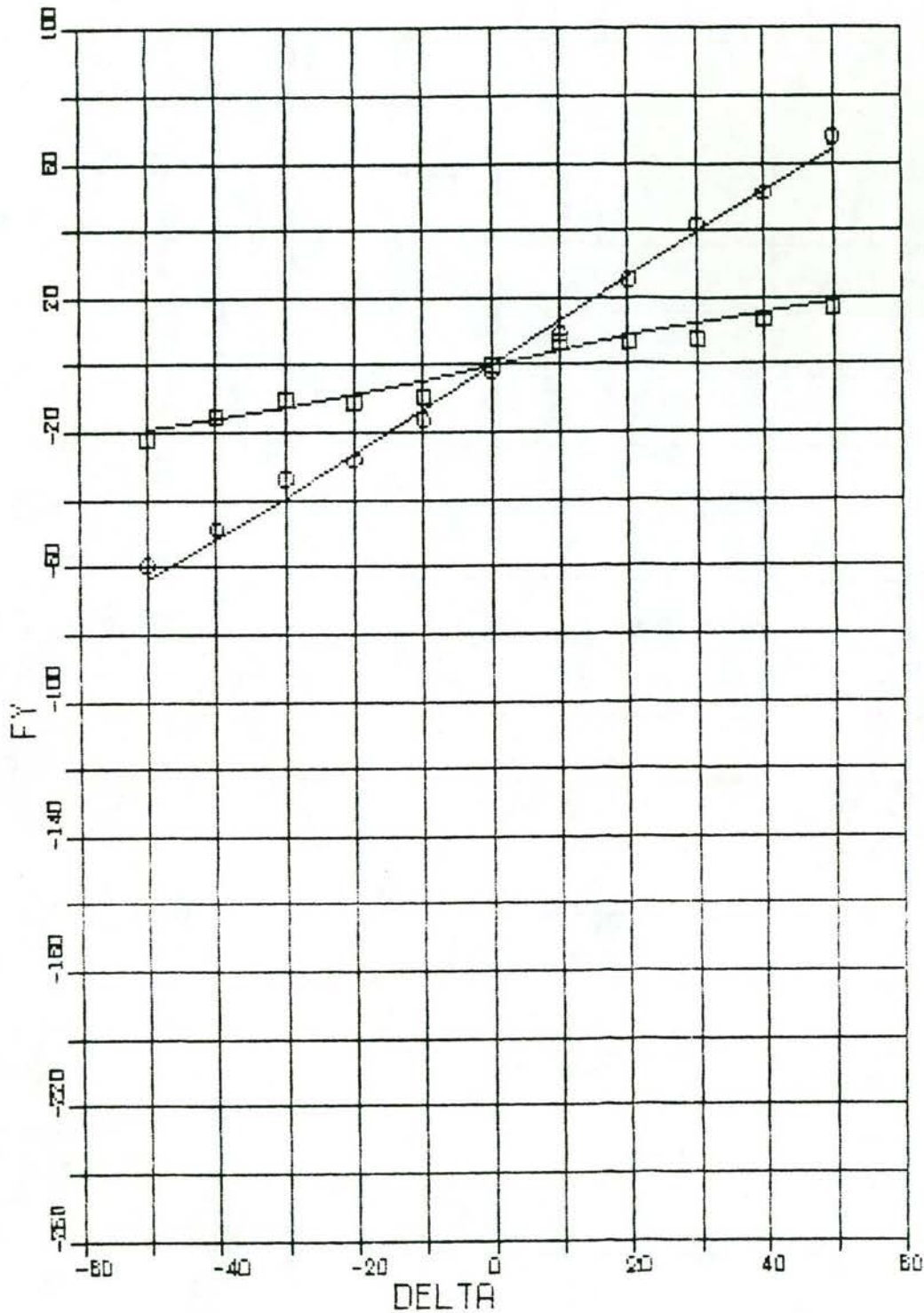
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CONS S 4.7500

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FXC = F (NUU,NN,UU,DDNN,DDUU,DV,VV)



DVK Projekt Windhinder

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RIJN-HERNE BALLAST

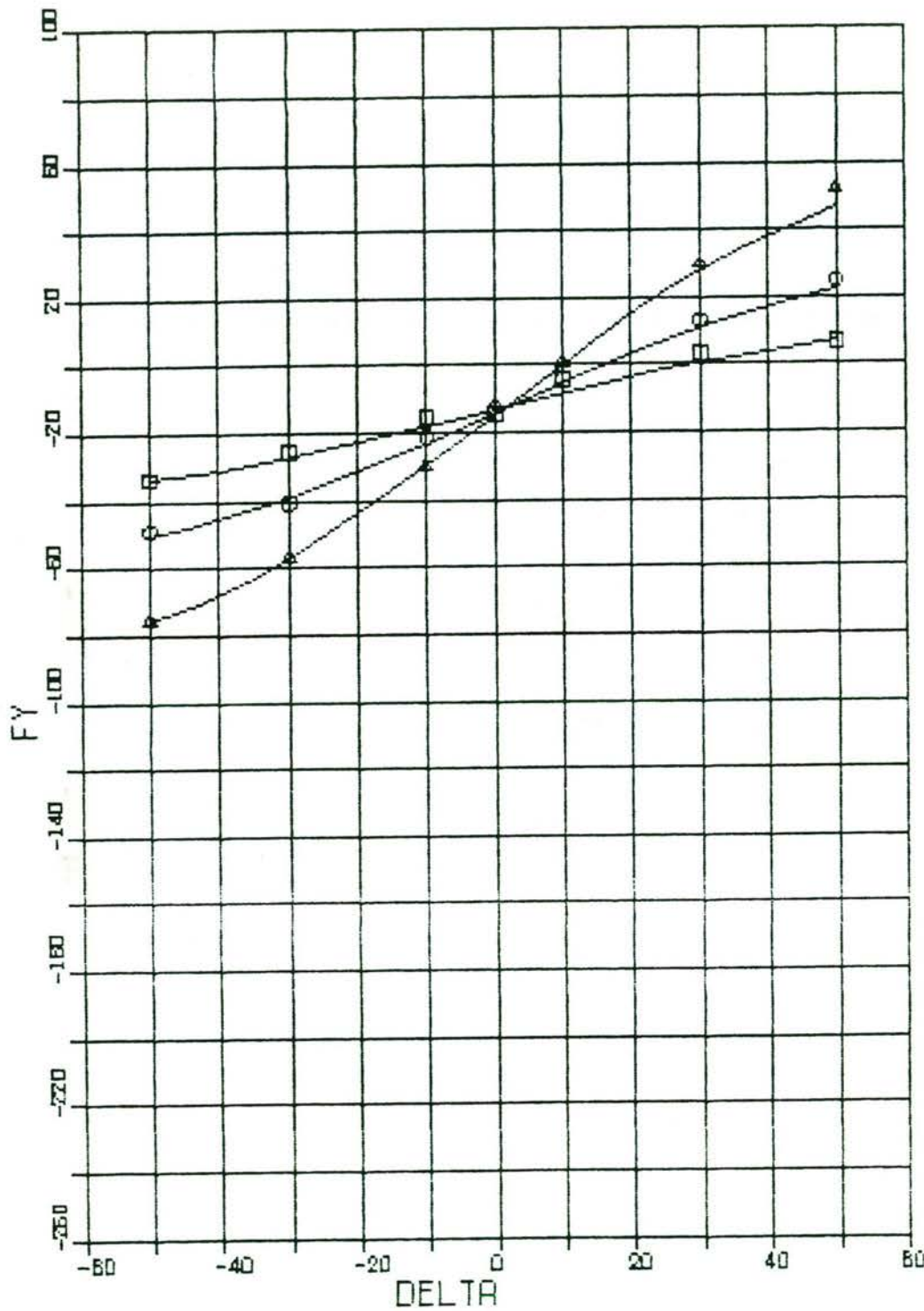
STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VE,VU,VUN,DDDUUU,DDDUVN,VVV)

DVK Projekt Windhinder

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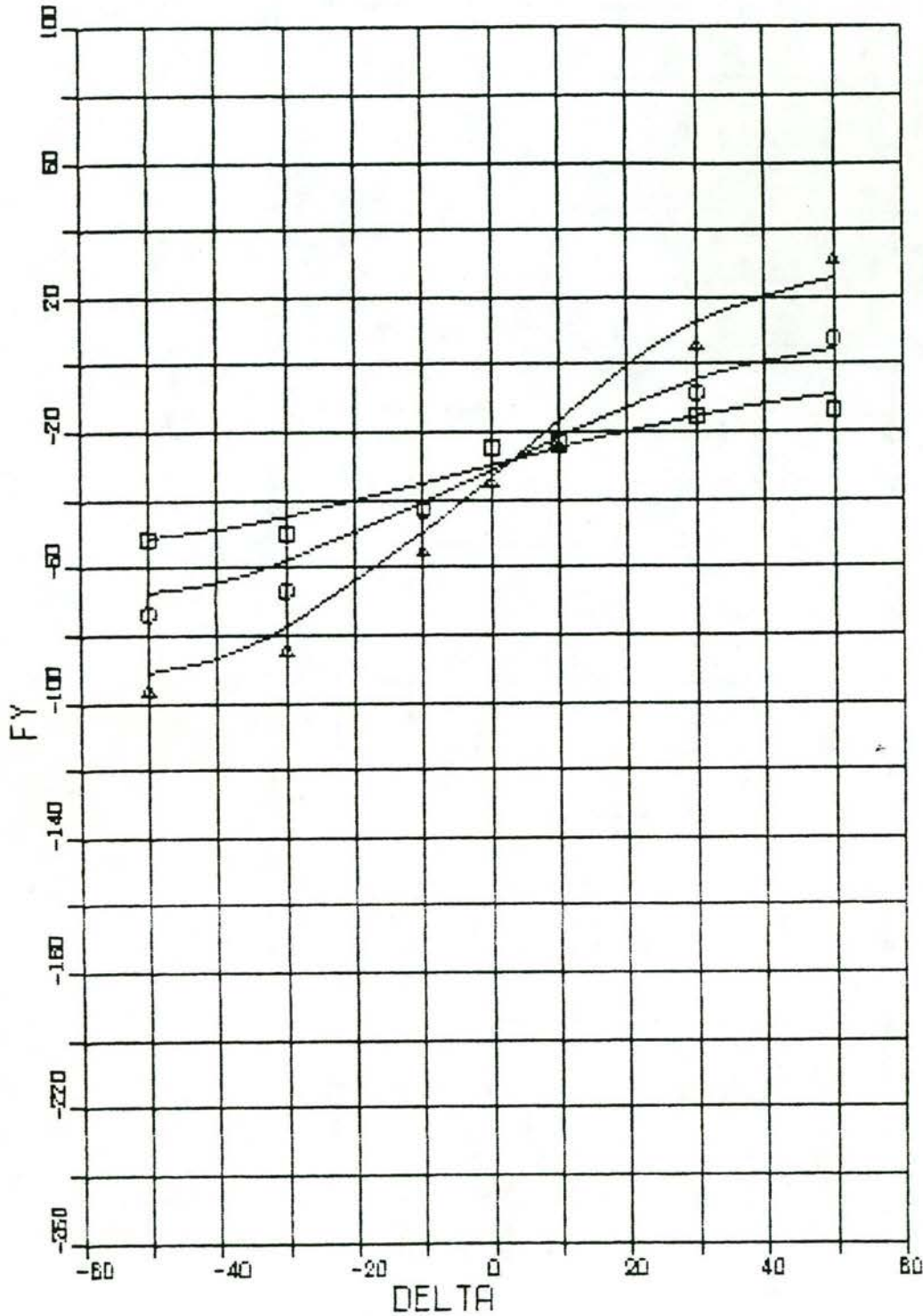
CONS 8 2.2500

CONS BETA 8.0000

RIJN-HERVE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VB, VU, VUN,DDDUUU,DDDVNN,VVV)



DVK Projekt Windhinder

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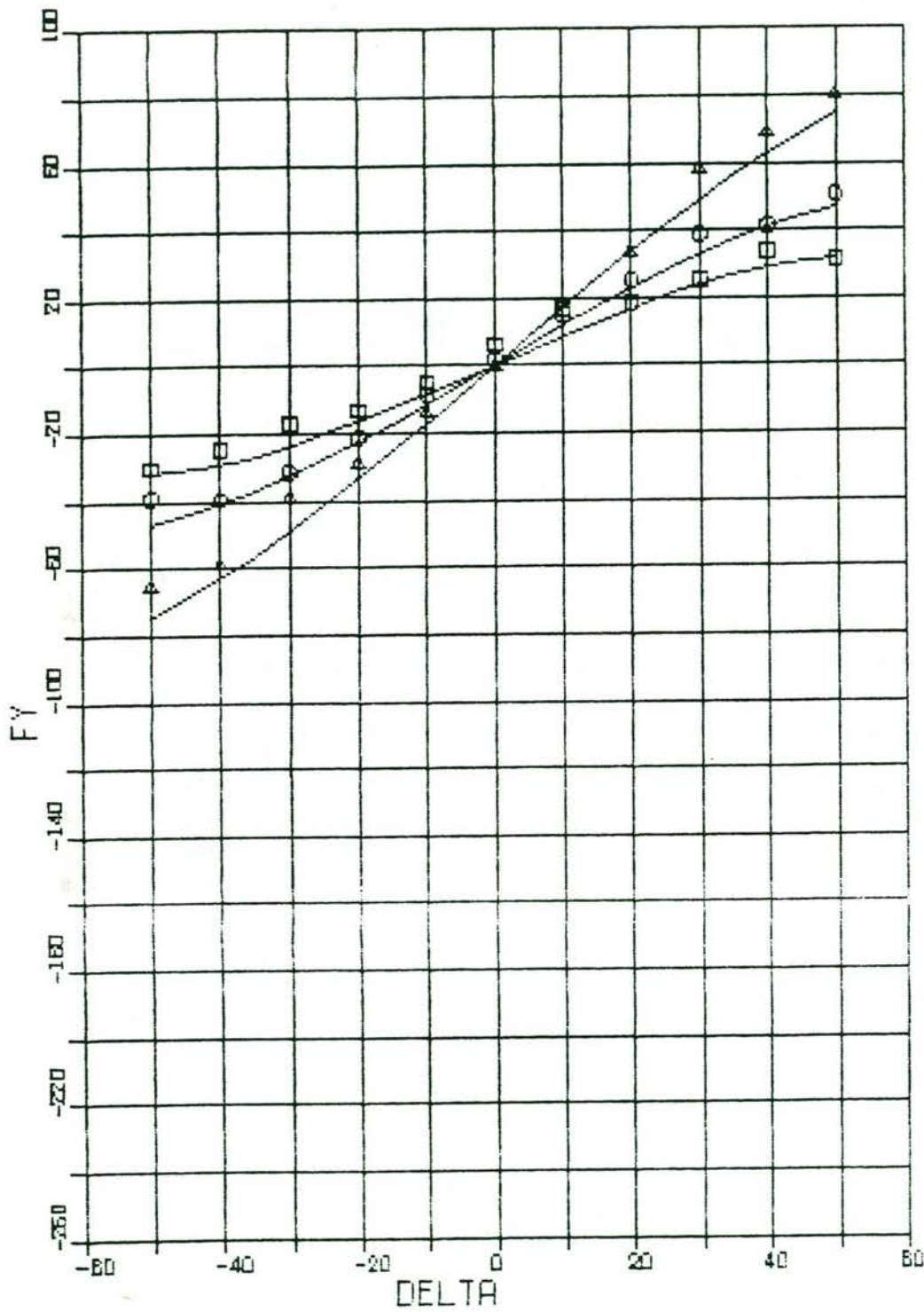
CONS S 2.2500

CONS BETA 16.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VB,VU,VUN,DDDUUU,DDDVNN,VVV)



DVK Projekt Windhinder

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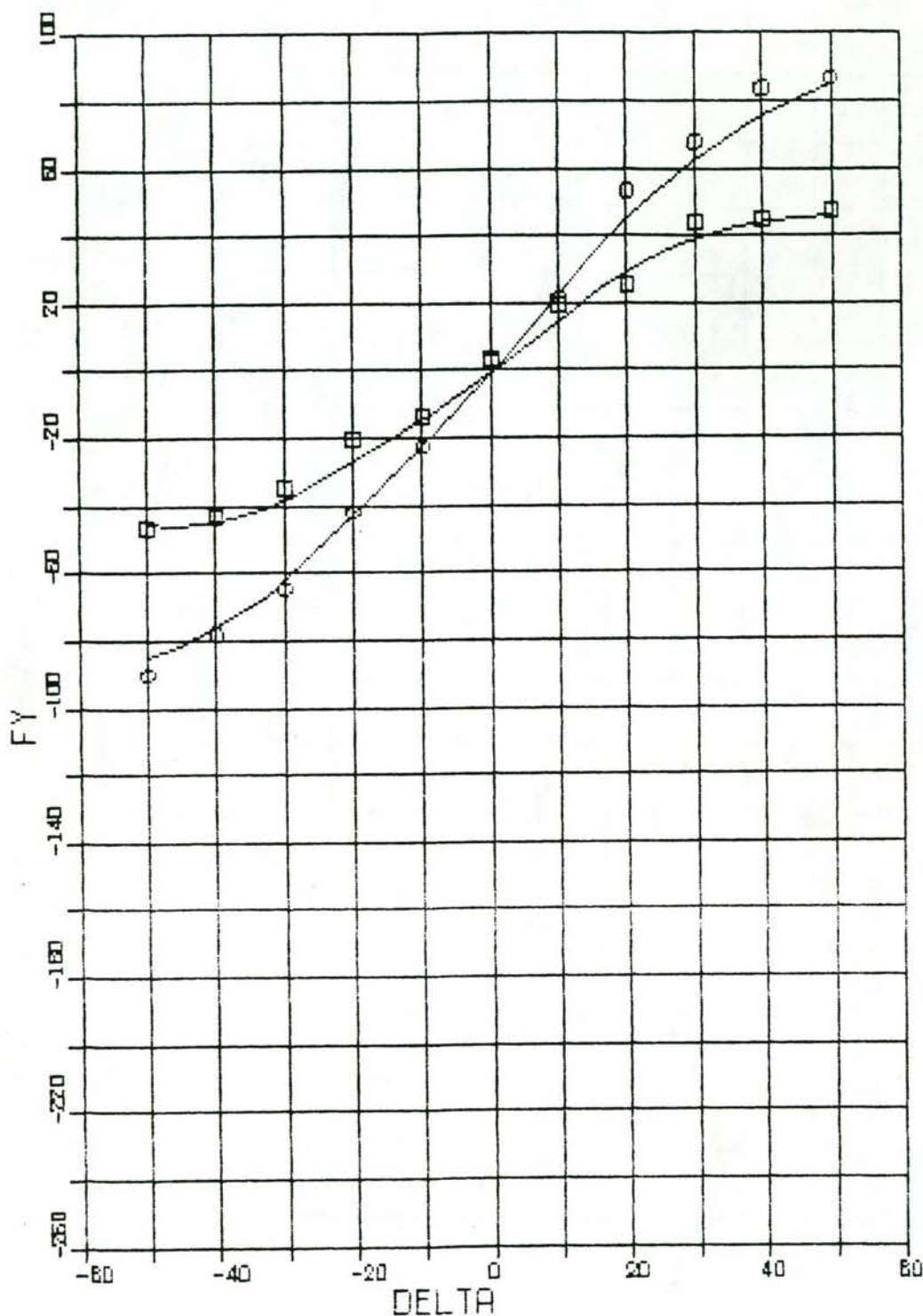
CONS S 3.5000

CONS BETA .0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DOU,DUUN,DUVN,VE,VU,VUN,DOOUU,DOOVN,WW)



DVK Projekt Windhinder

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CONS S 4.7500

CONS BETA .0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VS,VU,VUN,DDUUU,DDUVN,VVV)

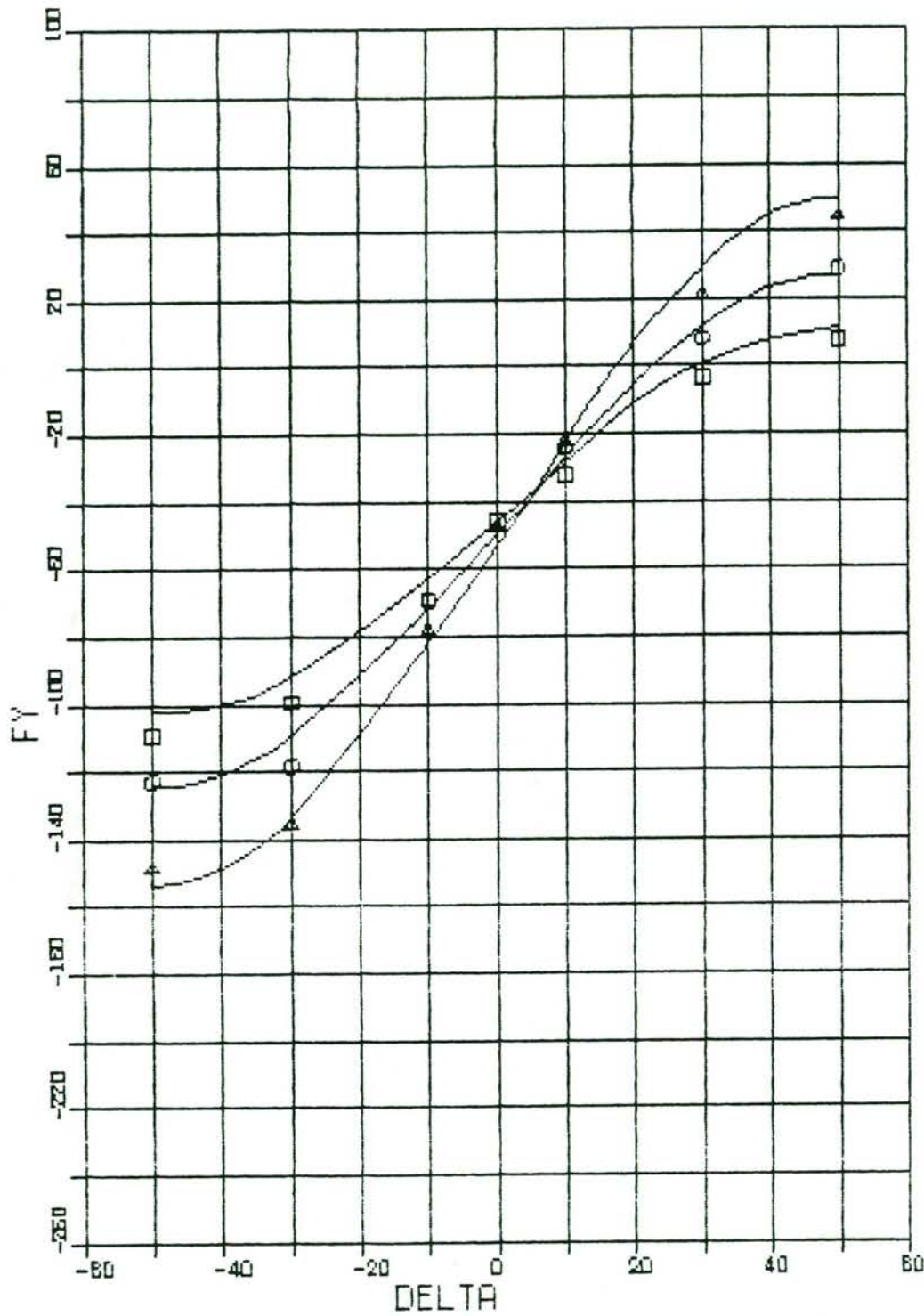
DVK Projekt Windhinder

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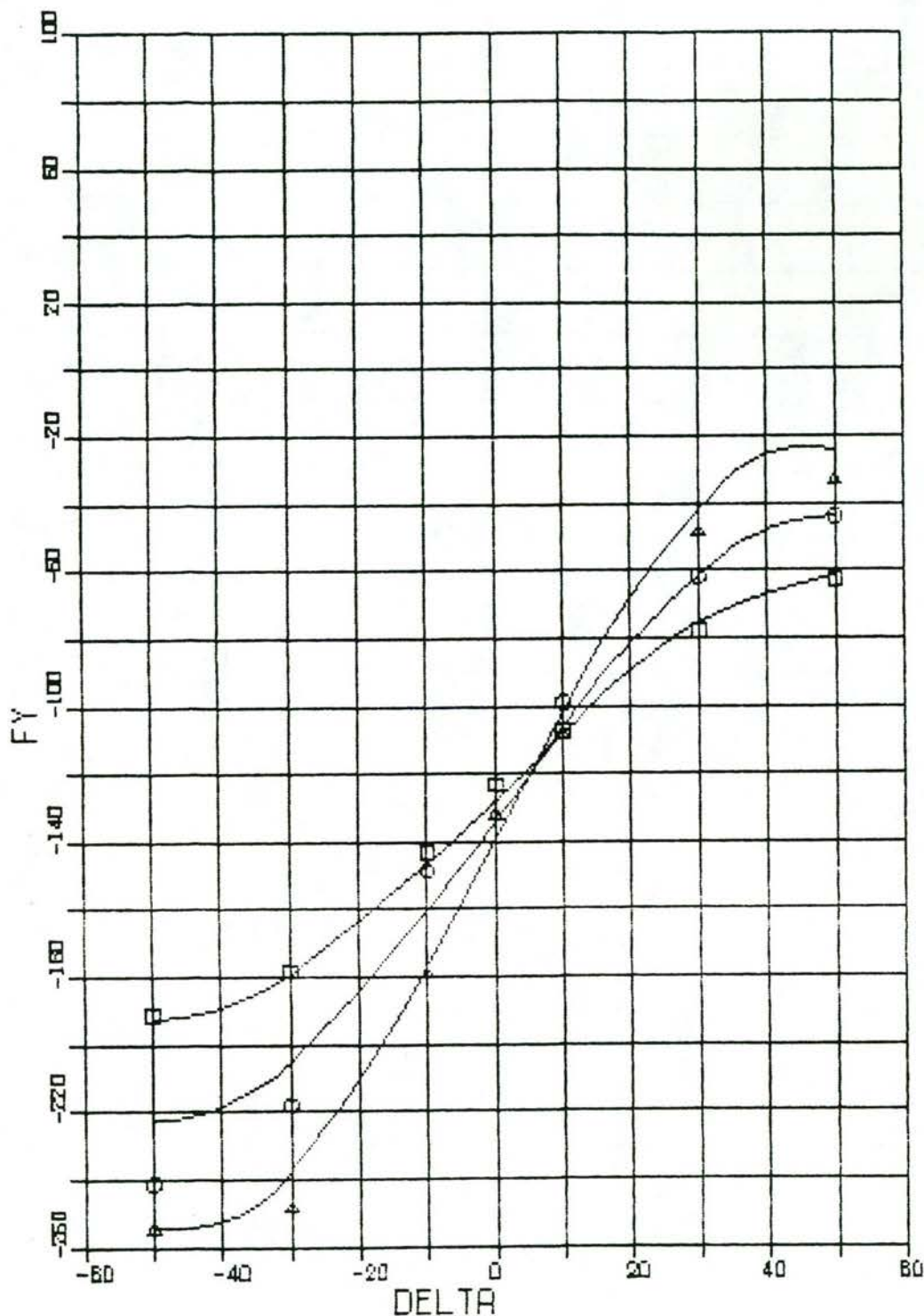
CONS 8 4.7500

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (CONN, DUU, DUUN, DUYN, VB, VD, VUN, DDDUUU, DDDVNN, VVV)



DVK Projekt Windhinder-

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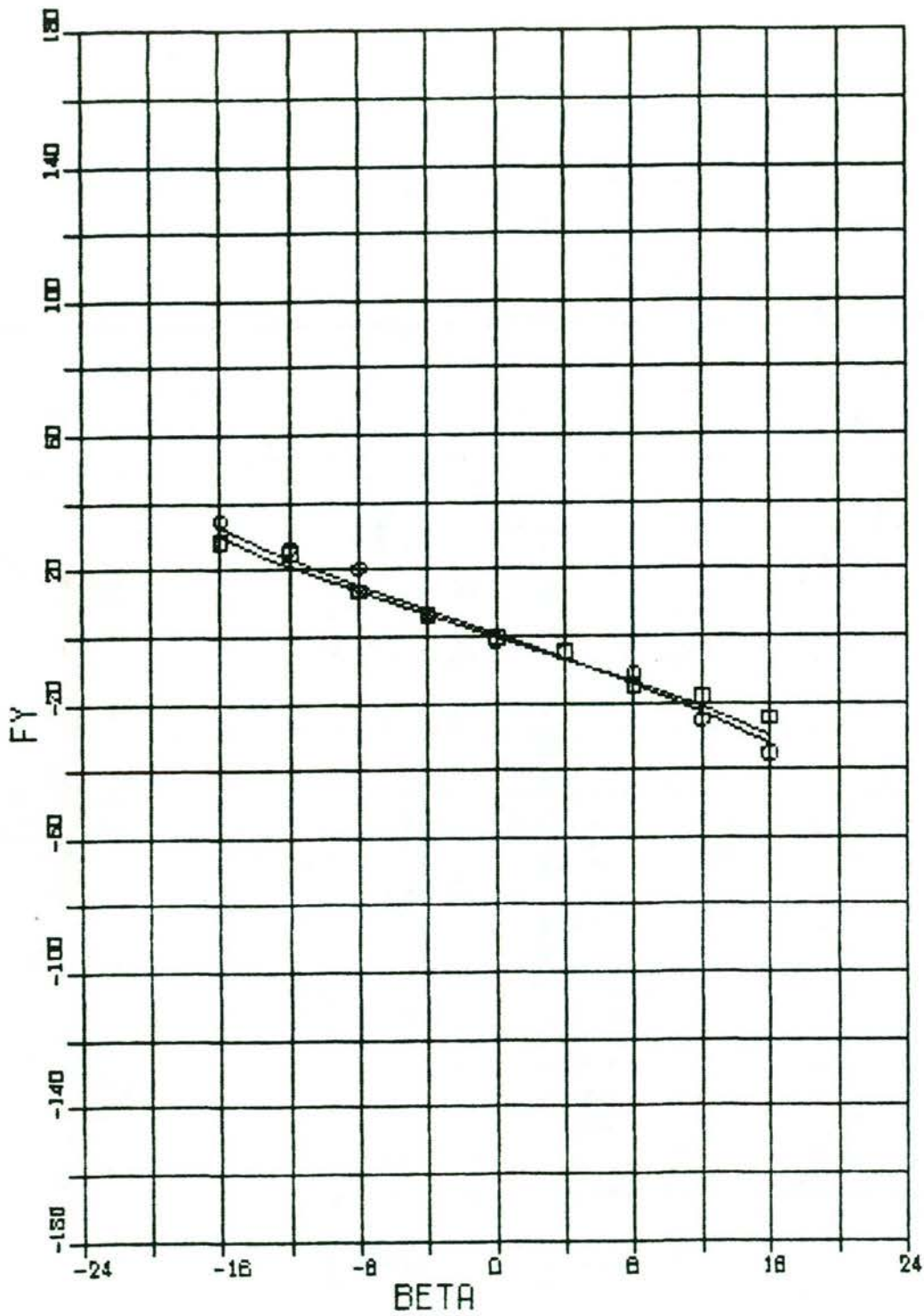
CONS S 4.7500

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VB,VU,VUN,DDDUUU,DDDVNN,VVV)



DVK Projekt Windhinder

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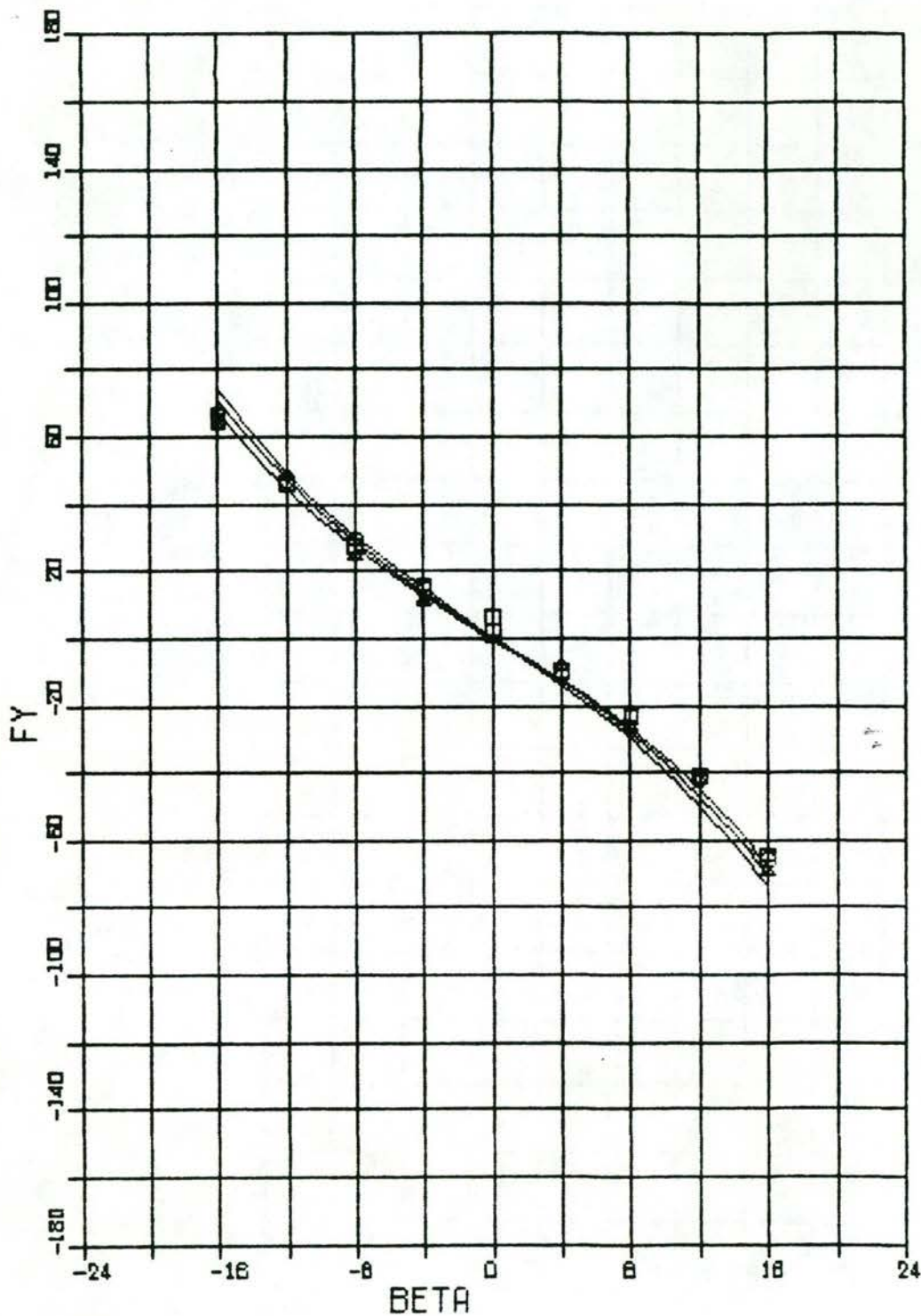
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RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VE,VU,VUN,DDUUU,DDVNN,VVV)



DVK Projekt Windhinder

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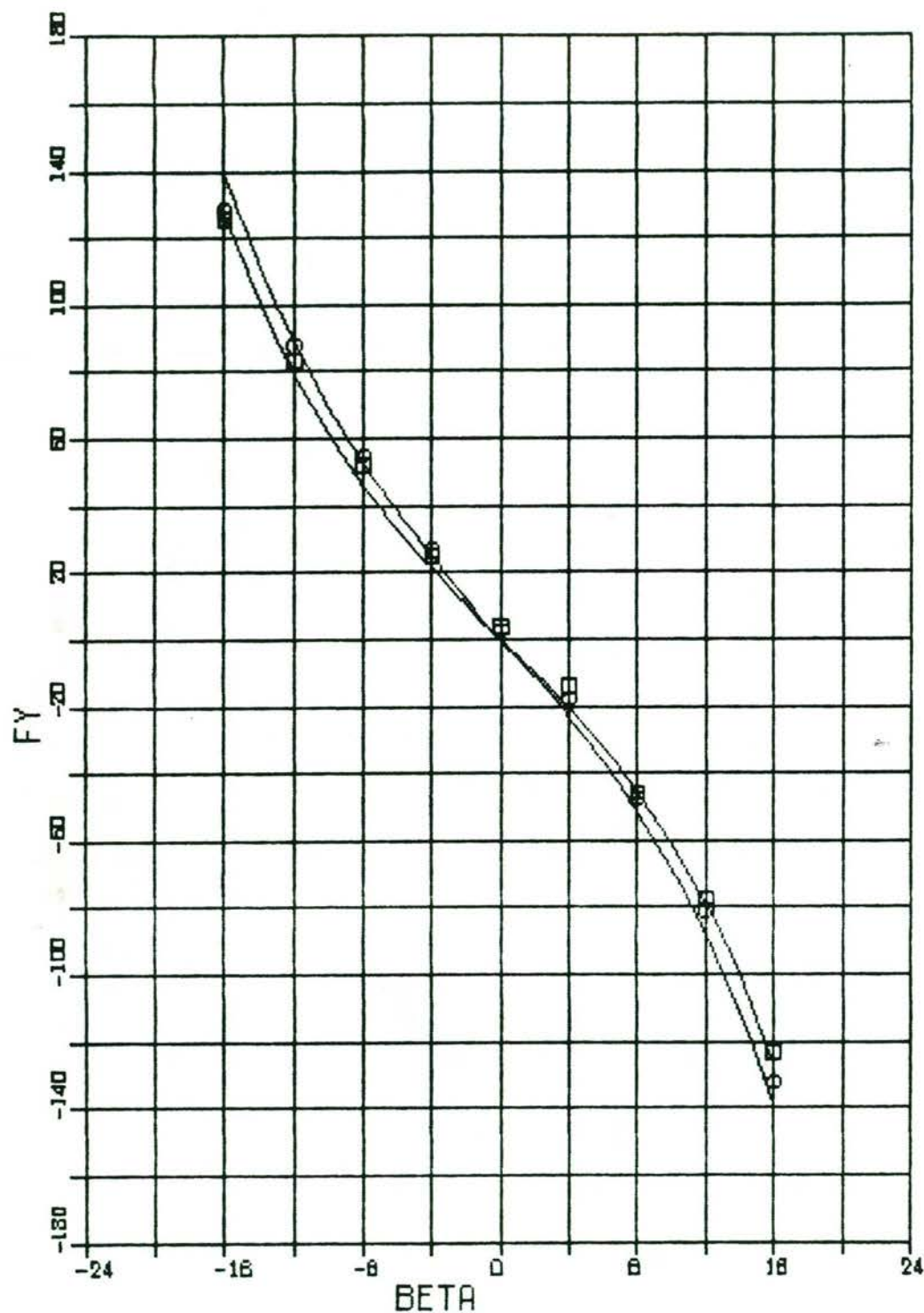
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CONS S 3.5000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VB,VU,VUN,DDUUU,DDVNN,VVV)



DVK Projekt Windhinder

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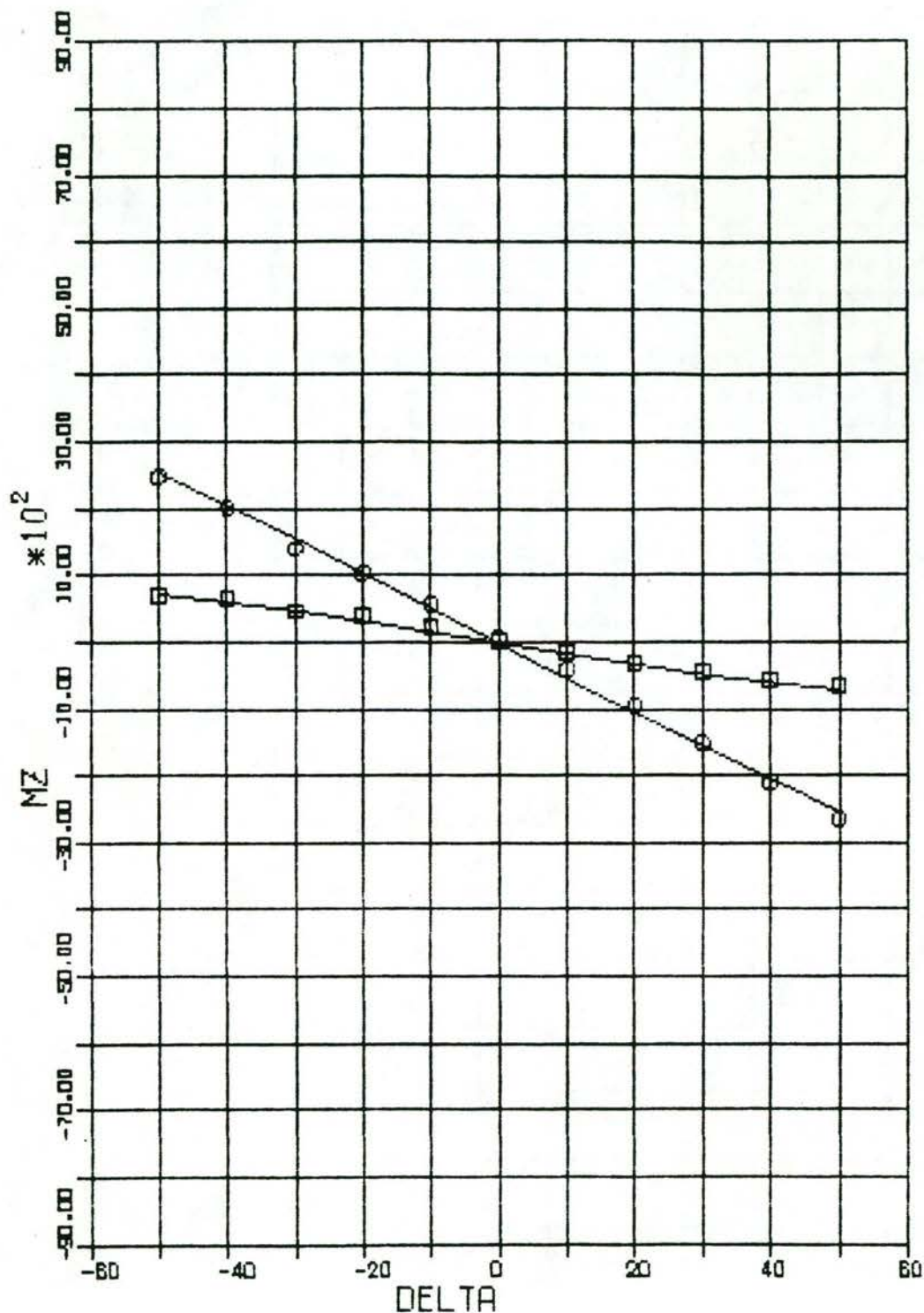
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RIJN-HERNE BALLAST

STATISCHE PROEVEN

FY = F (DNN,DUU,DUUN,DUVN,VB,VU,VUN,DDUUU,DDVNN,VVV)



DVK Projekt Windhinder

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RIJN-HERNE BALLAST

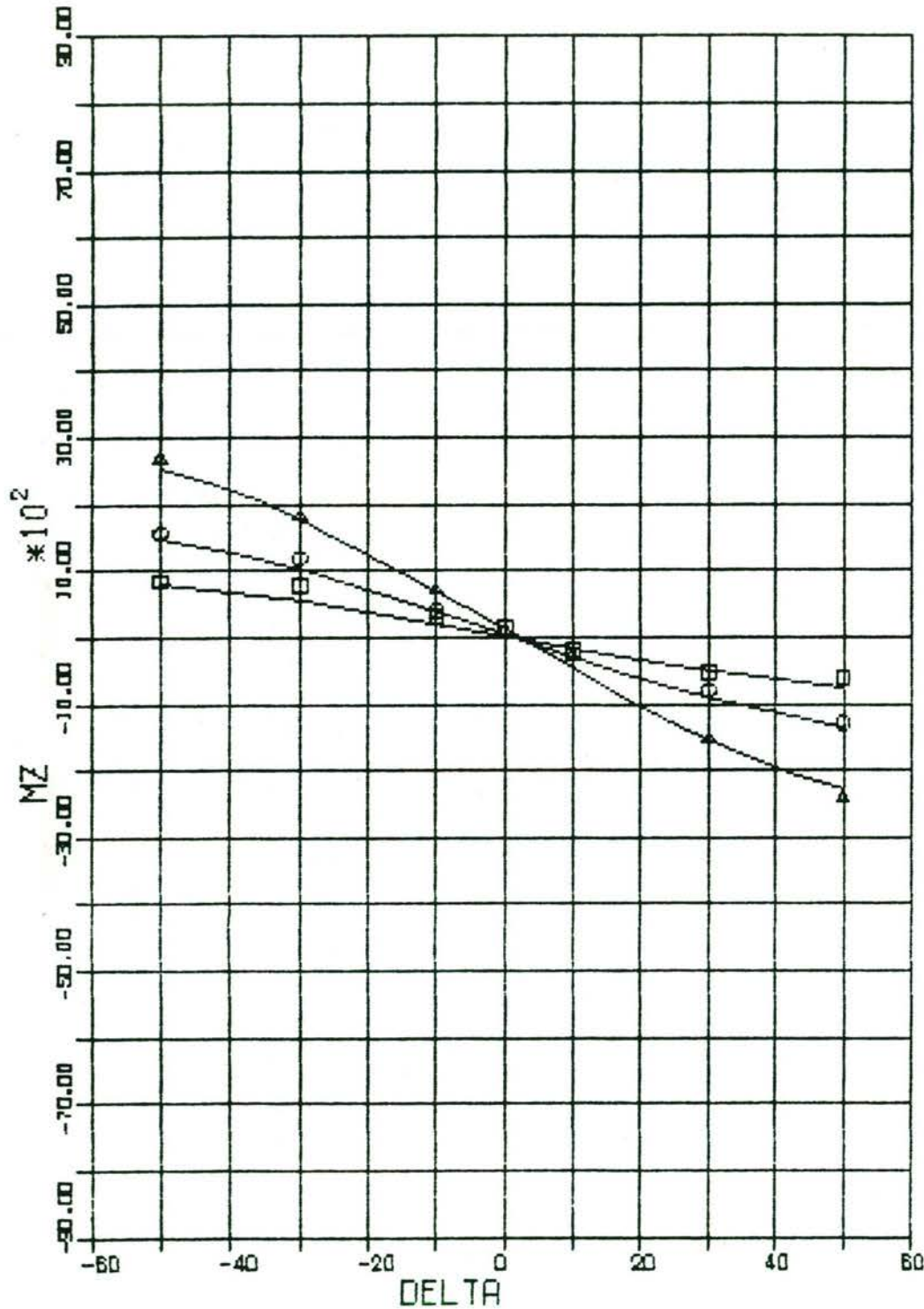
STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDDUUU,DDDVNN,VVV)

DVK Projekt Windhinder

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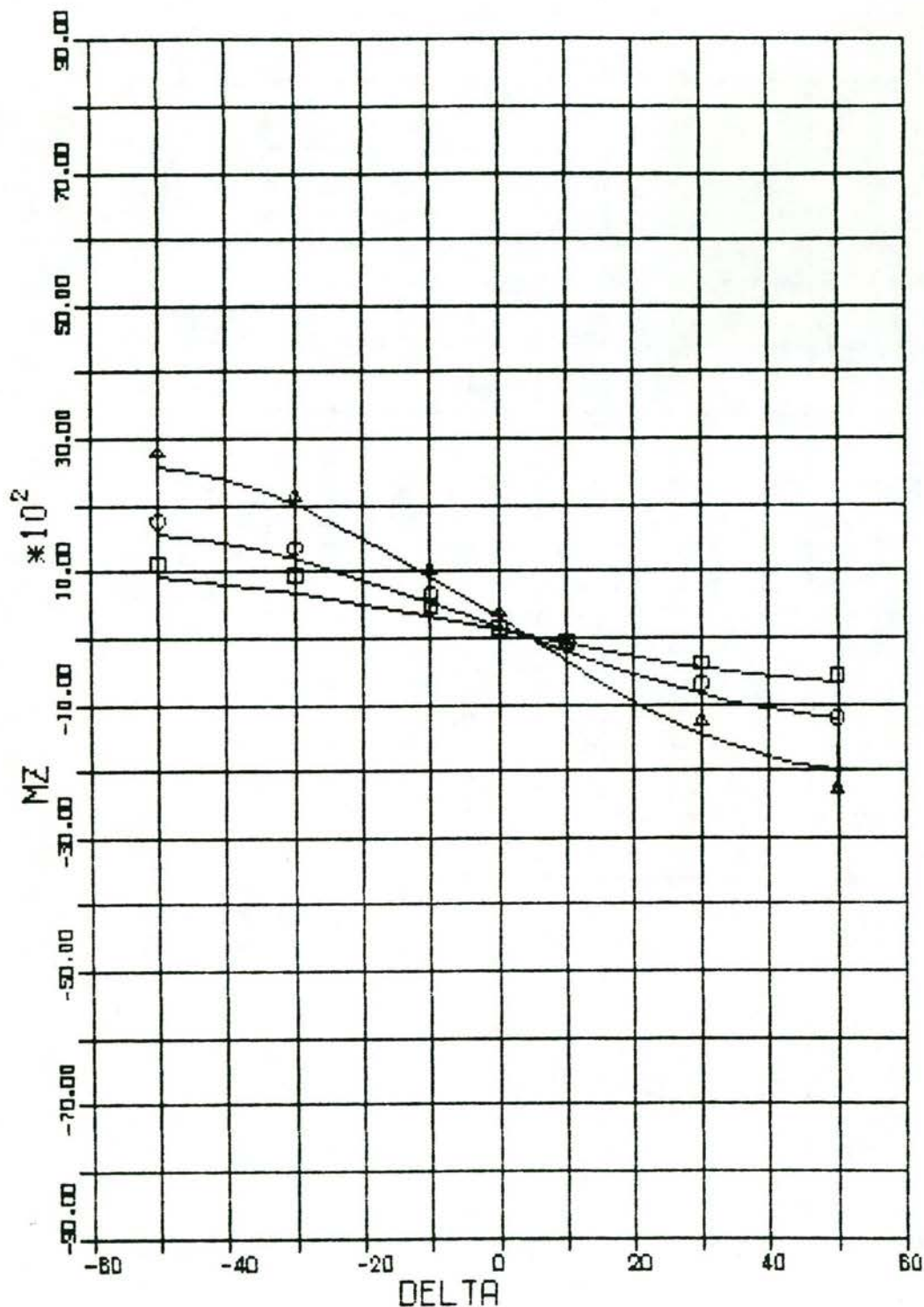
CONS S 2.2500

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDDUUU,DDDVNN,VVV)



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RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,YNN,DDUUU,DDUUN,VVV)

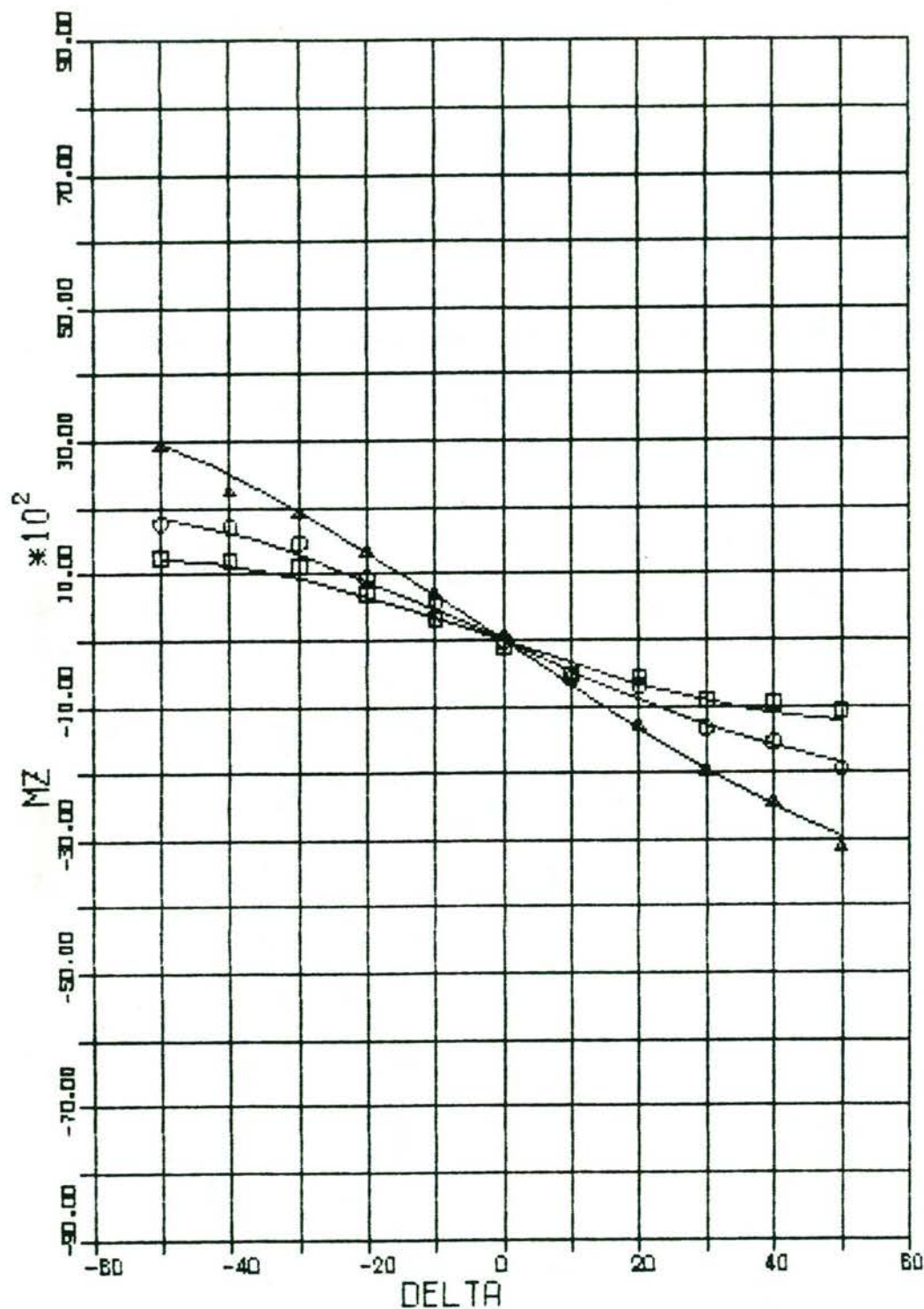
DVK Projekt Windhinder

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUU,DDUVN,VVV)

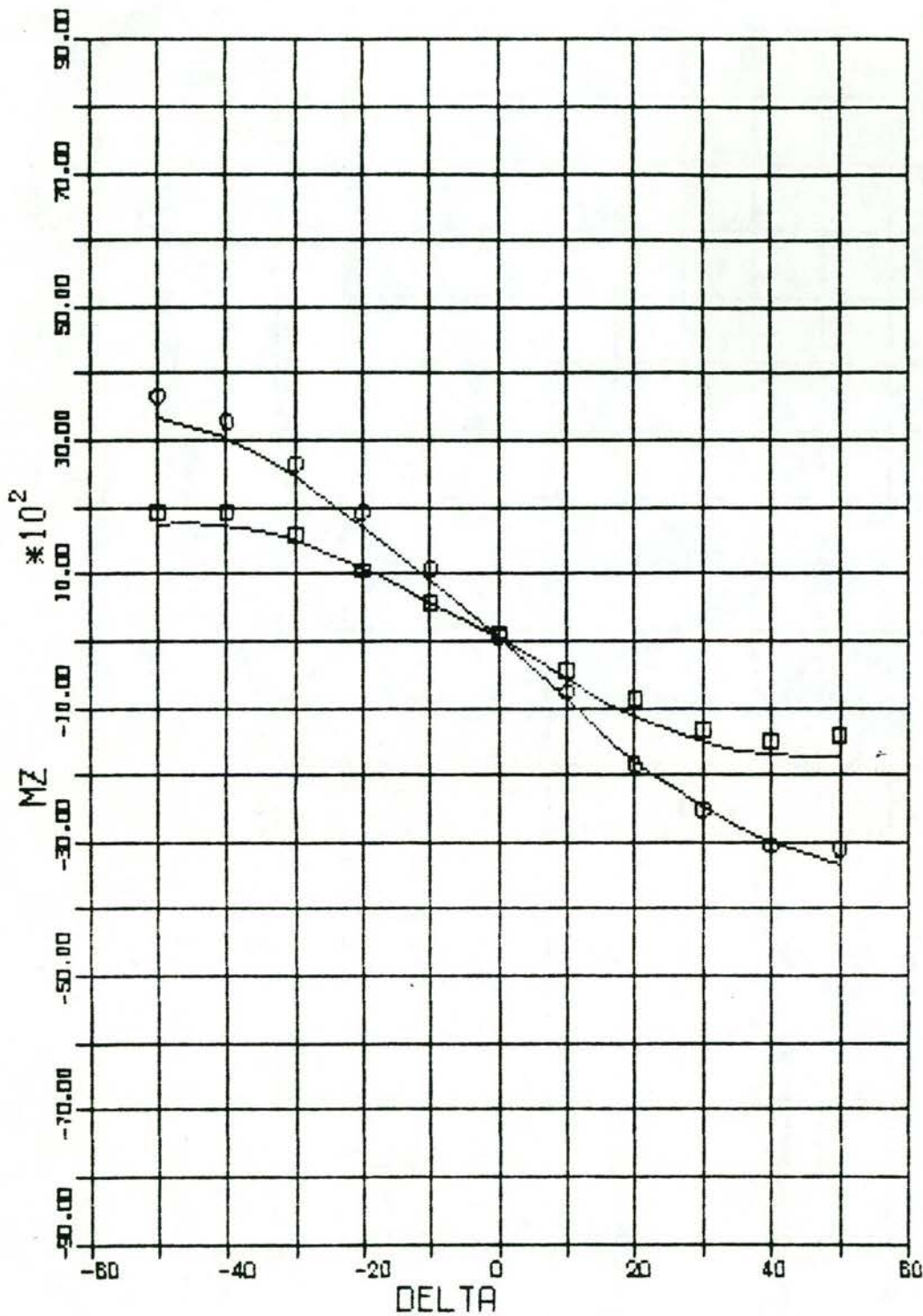
DVK Projekt Windhinder

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUU,DDOWNN,VVV)

DVK Projekt Windhinder

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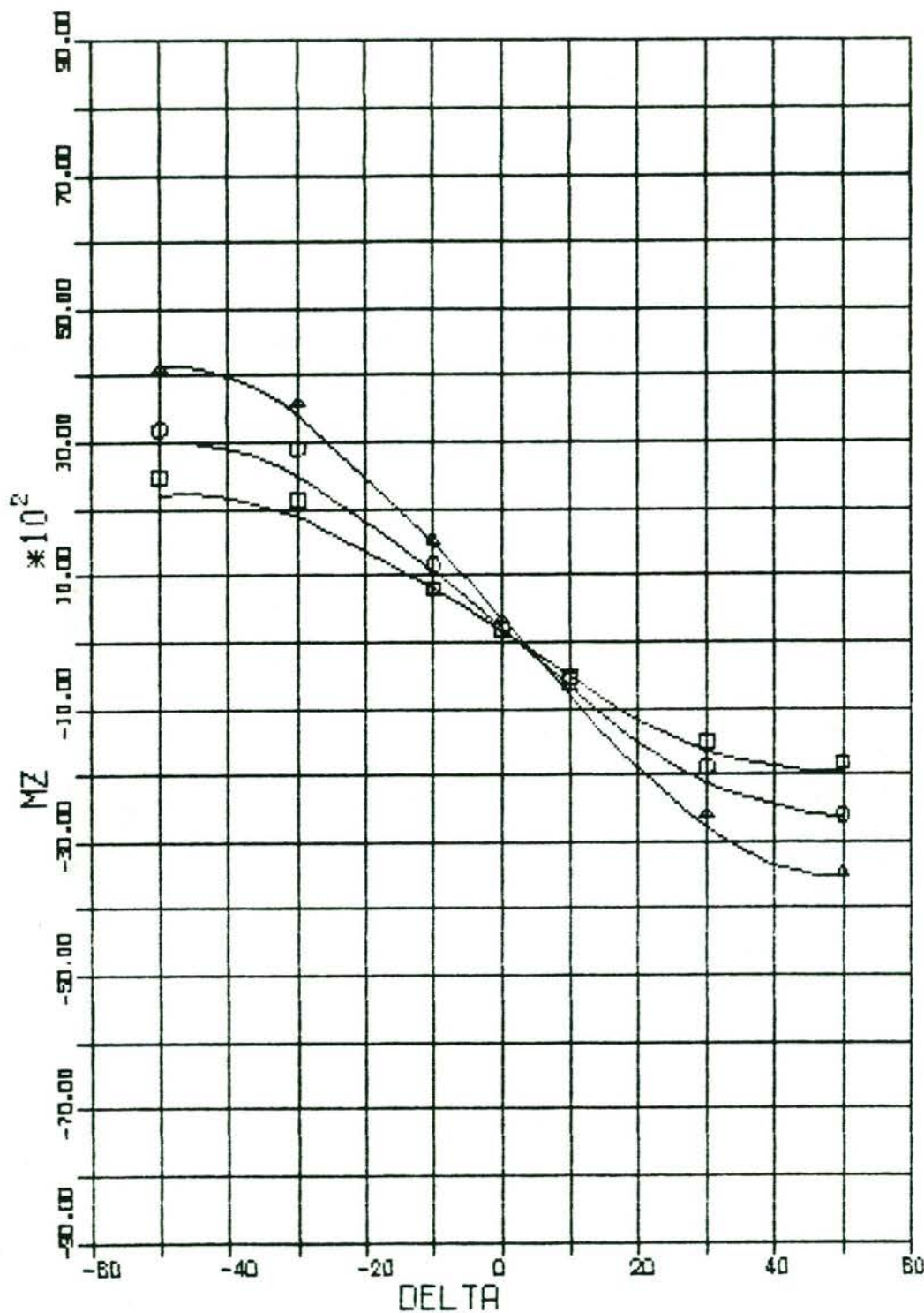
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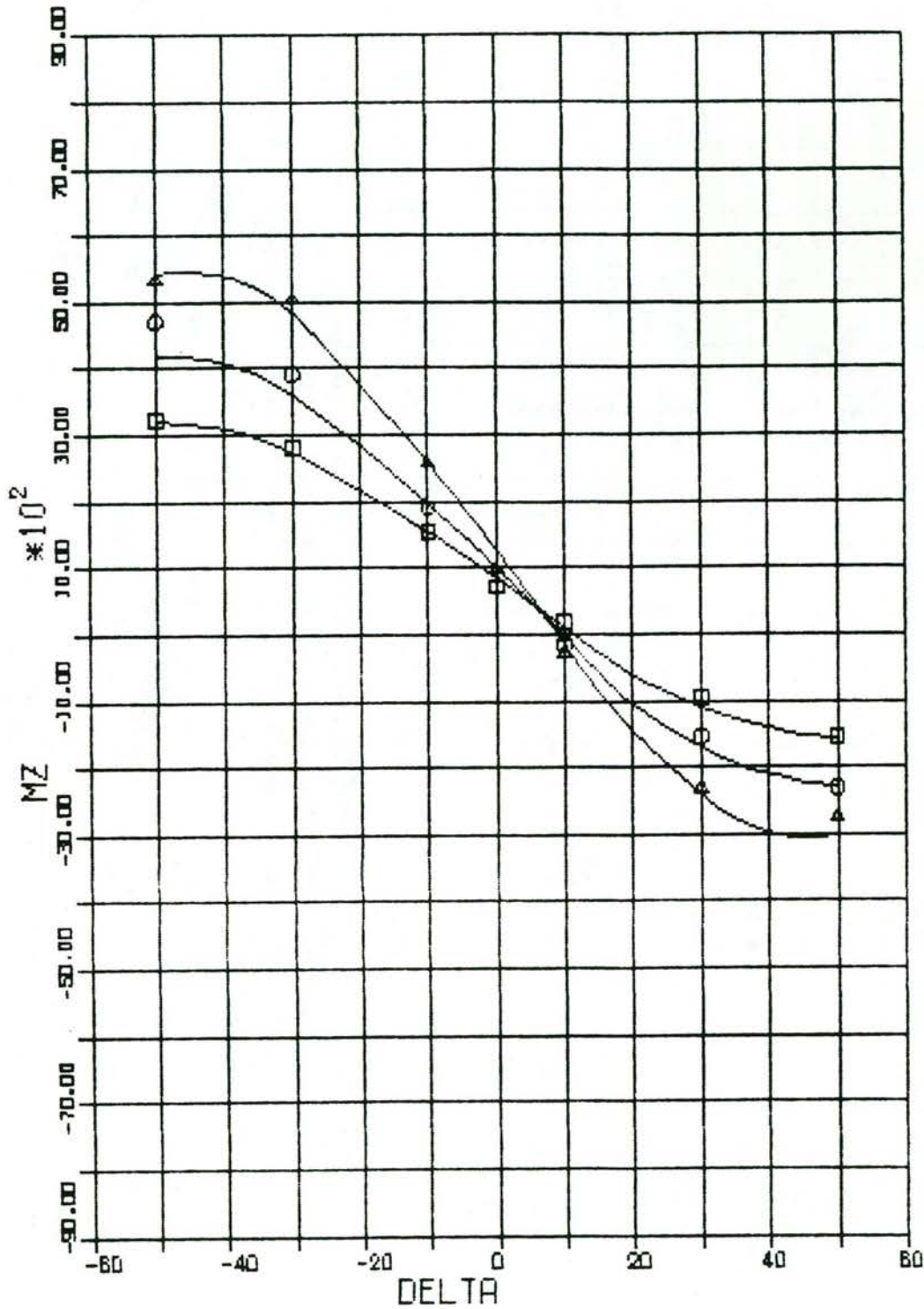
CONS S 4.7500

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RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (ONN,DUU,DUUN,DUVN,VNN,DDDUU,DDDVNN,VVV)



DVK Projekt Windhinder

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CONS BETA 16.0000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

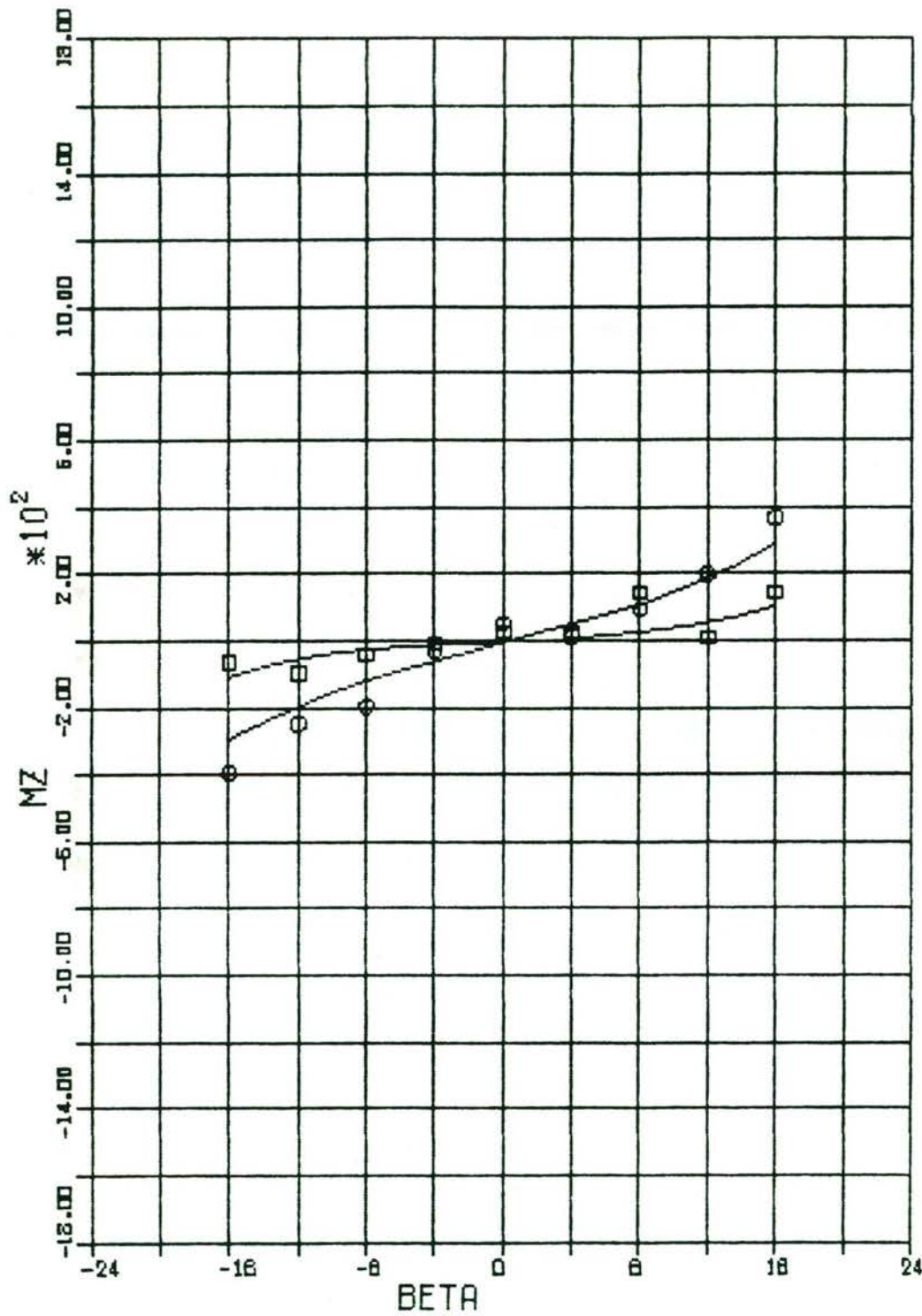
MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUU,DDUVN,VVV)

DVK Projekt: Windhinder

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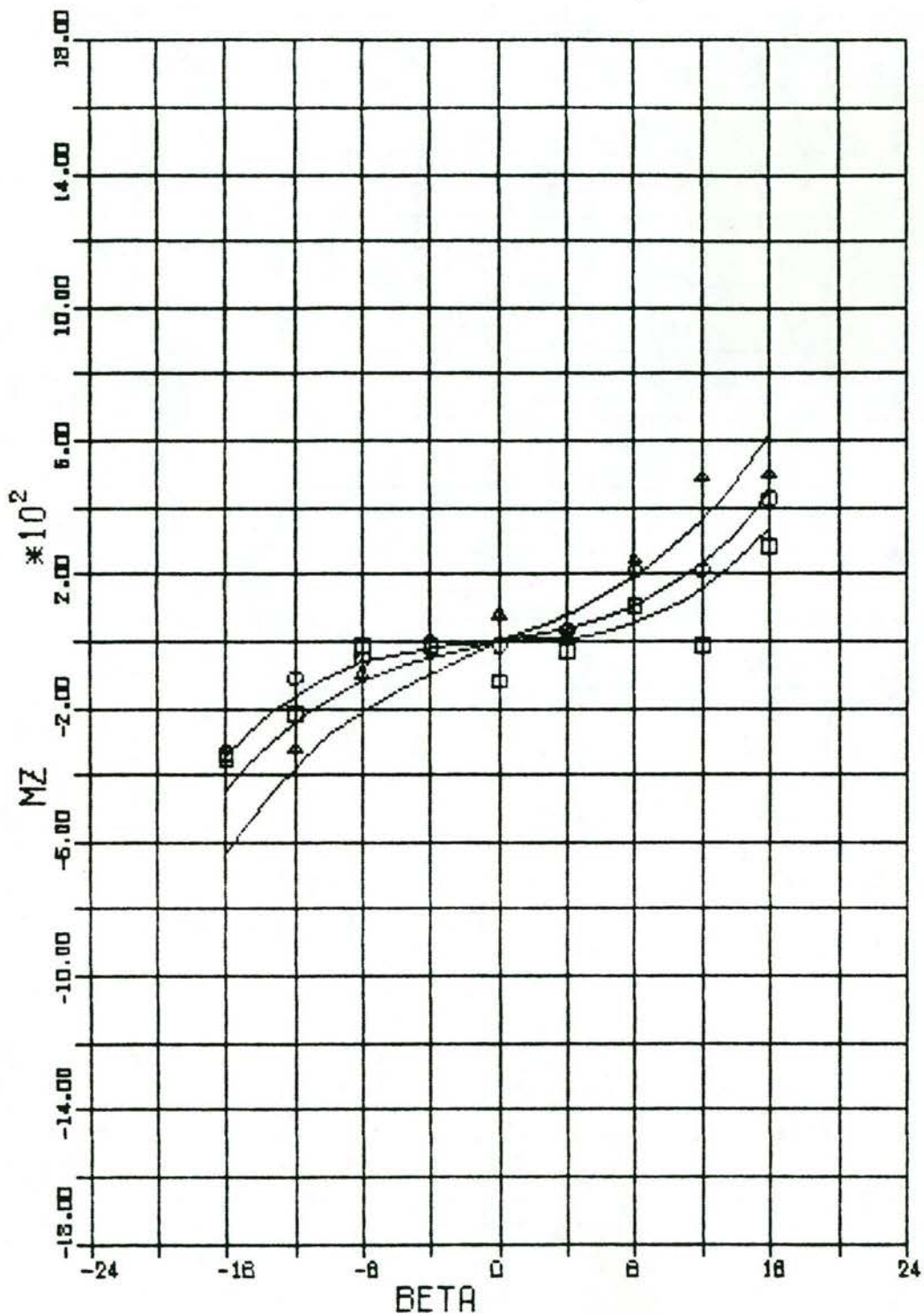


CONS S 2.2500

RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUUU,DDDVNN,VVV)



DVK Projekt Windhinder

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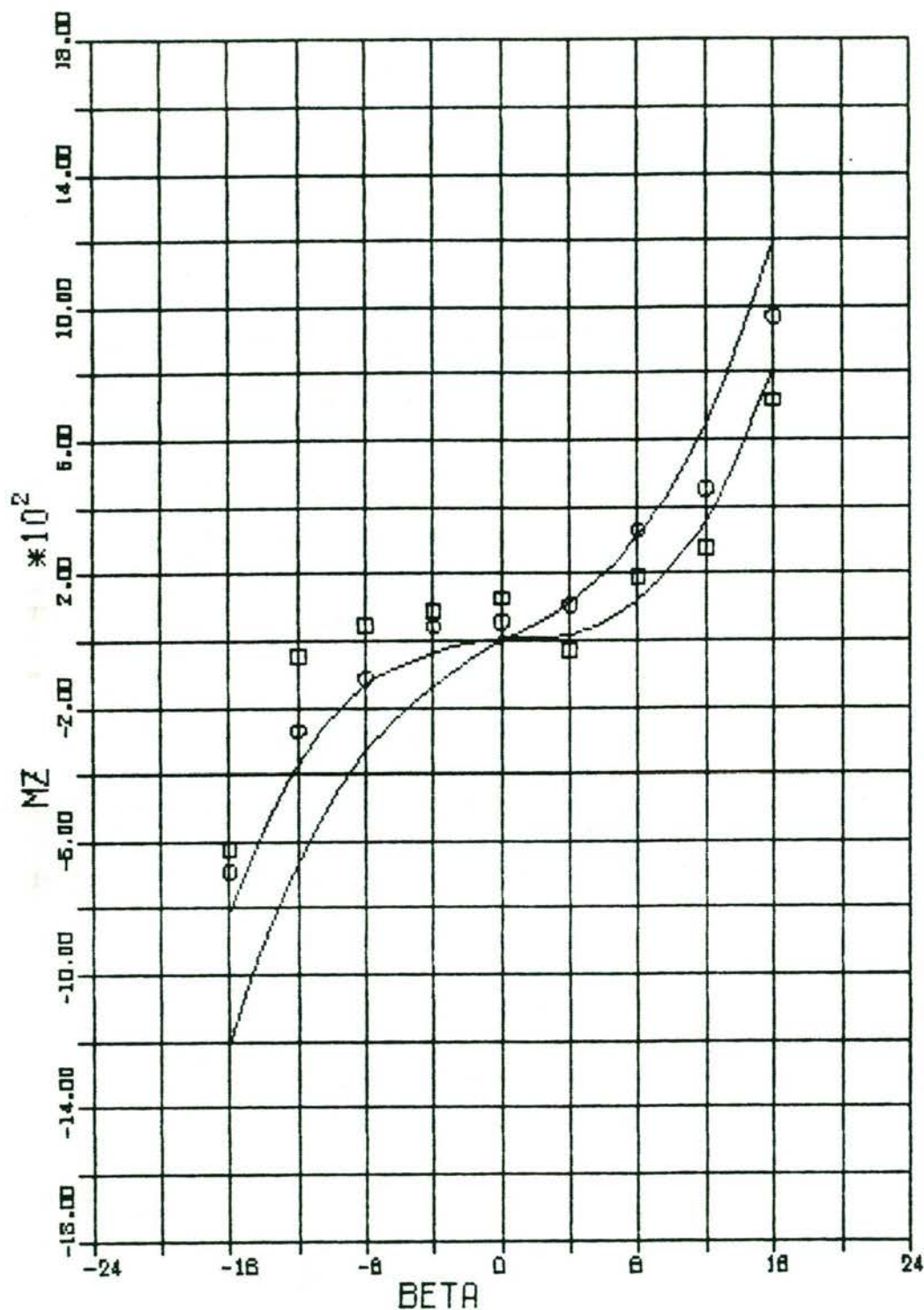
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CONS S 3.5000

RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUU,DDUVN,VVV)



DVK Projekt: Windhinder

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CONS S 4.7500

RIJN-HERNE BALLAST

STATISCHE PROEVEN

MZ = M (DNN,DUU,DUUN,DUVN,VNN,DDUUU,DDUVNN,VVV)

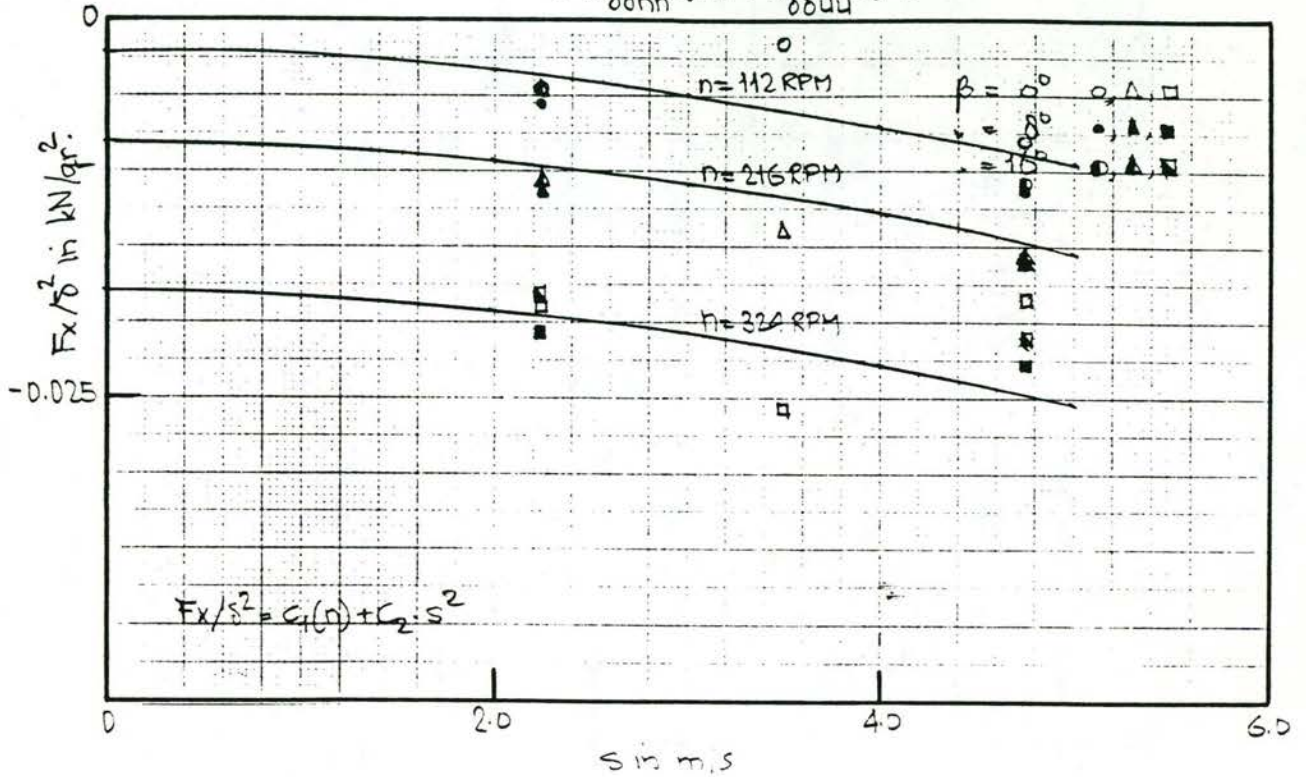
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

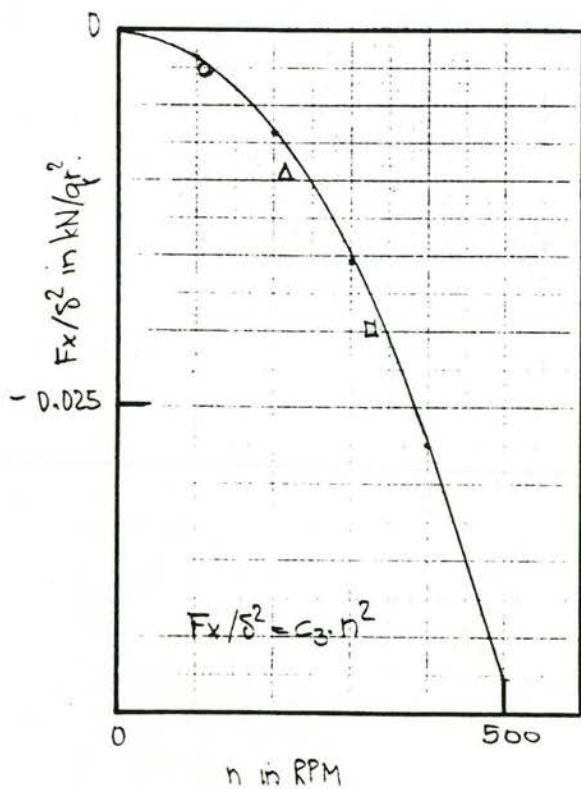
rijn - herne kanaal schip ballast, breed water

$$F_x = F_x(\delta^2) = X_{\delta\delta nn} \cdot \delta^2 \cdot n^2 + X_{\delta\delta ss} \cdot \delta^2 \cdot s^2$$

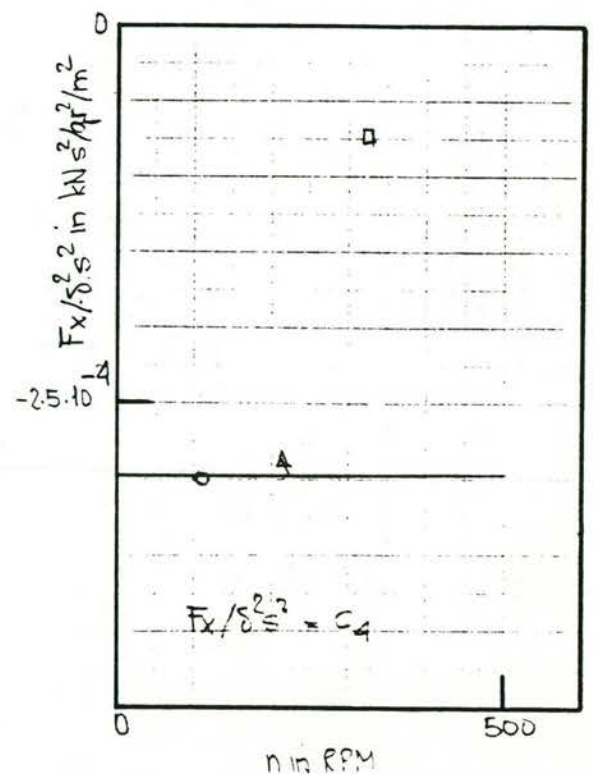
$$\hat{=} X_{\delta\delta nn} \cdot \delta^2 \cdot n^2 + X_{\delta\delta uu} \cdot \delta^2 \cdot u^2$$



$$F_x/\delta^2 = C_1(n) + C_2 \cdot s^2$$



$$F_x/\delta^2 = C_3 \cdot n^2$$



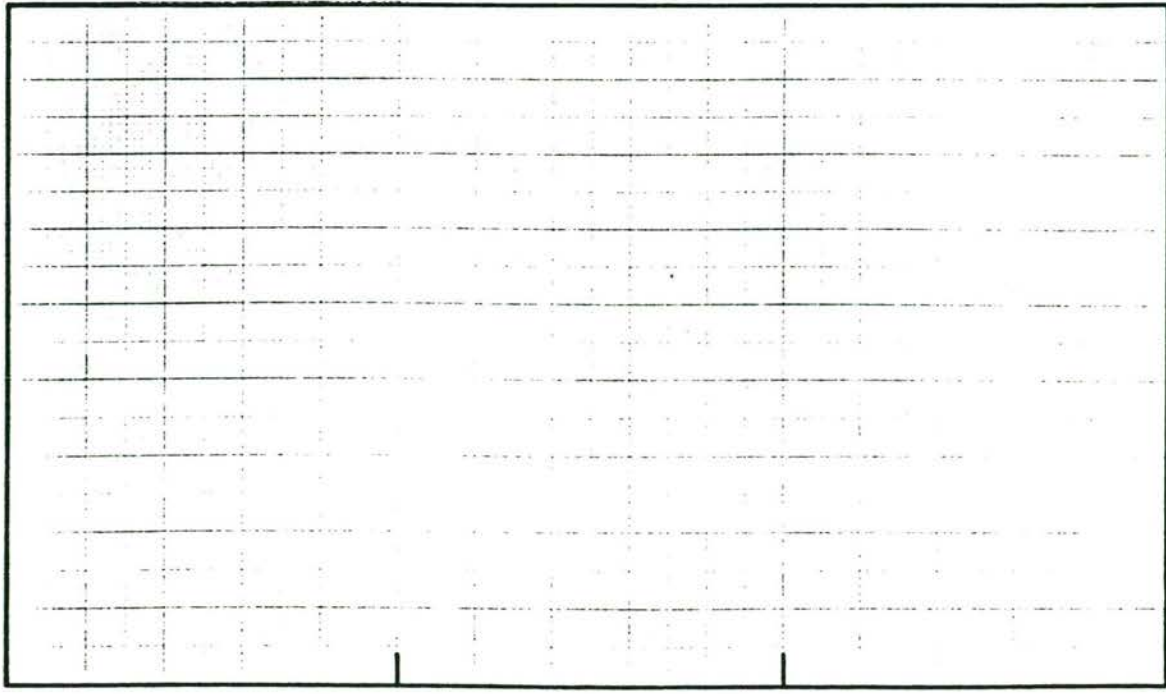
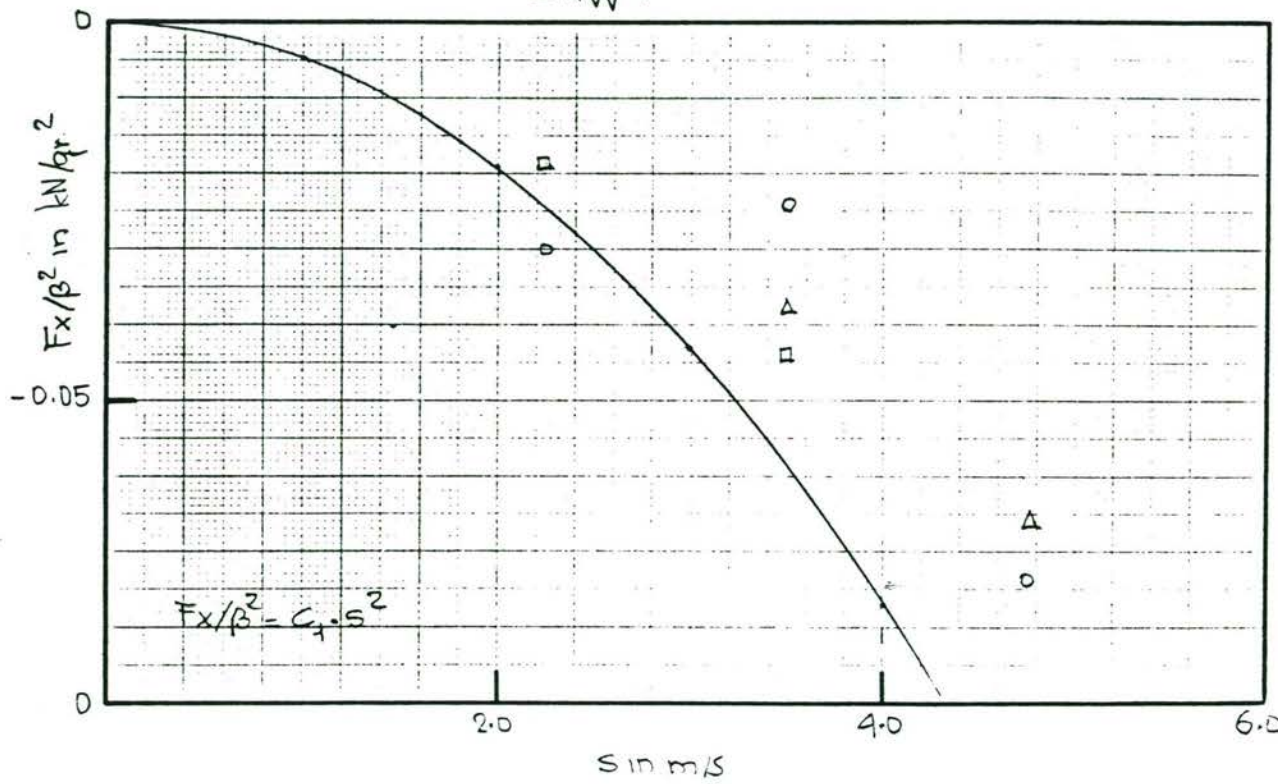
$$F_x/\delta^2 = C_4$$

DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_x(\delta=0) = X_{\beta} \beta s s^2 \cdot \beta s^2$$
$$\triangleq X_{VV} \cdot V^2$$

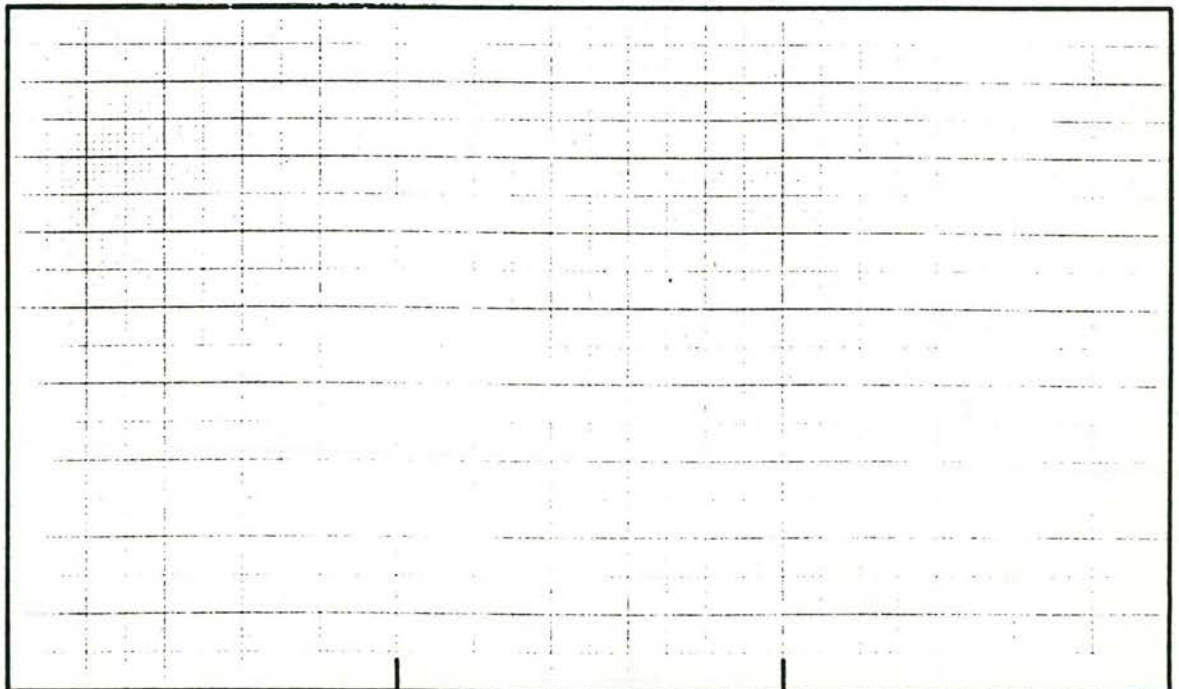
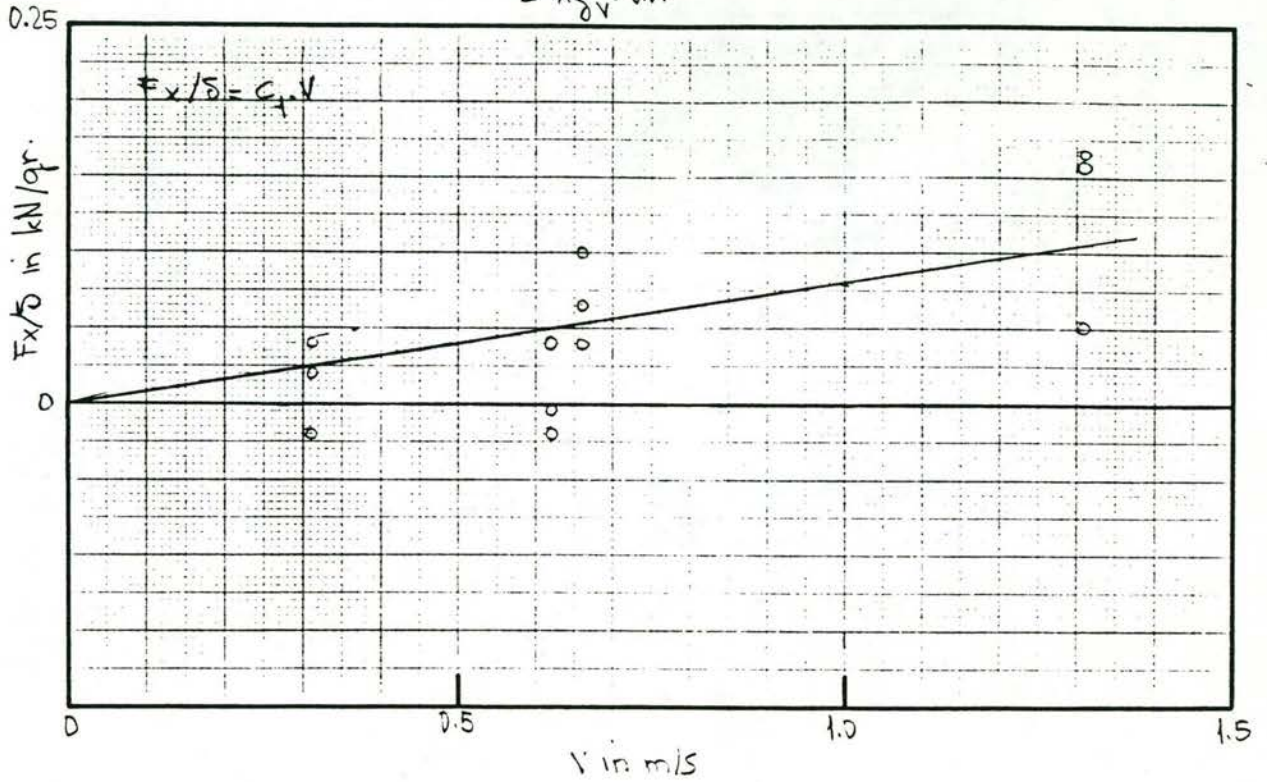


DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$\begin{aligned} \bar{F}_x = \bar{F}_x(\delta) &= X_{\delta \beta s} \cdot \delta \cdot \beta \cdot s \\ &\hat{=} X_{\delta v} \cdot \delta v. \end{aligned}$$



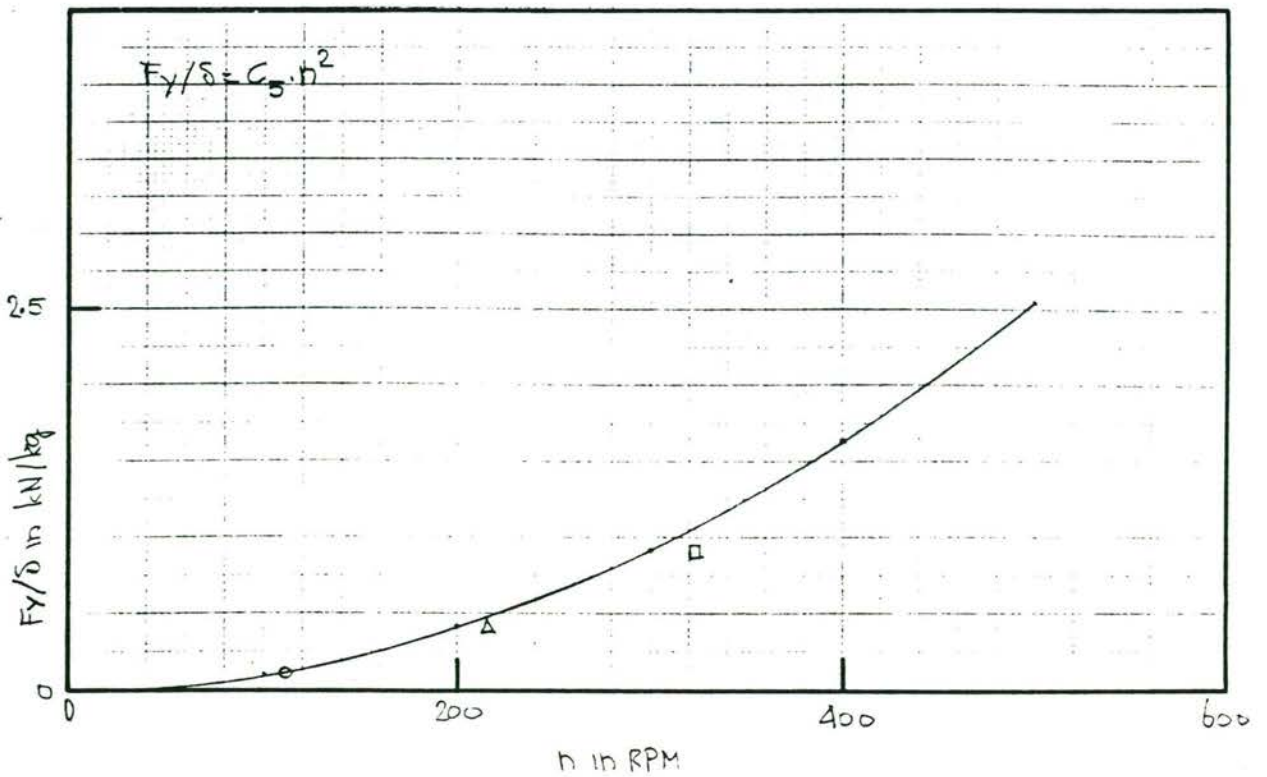
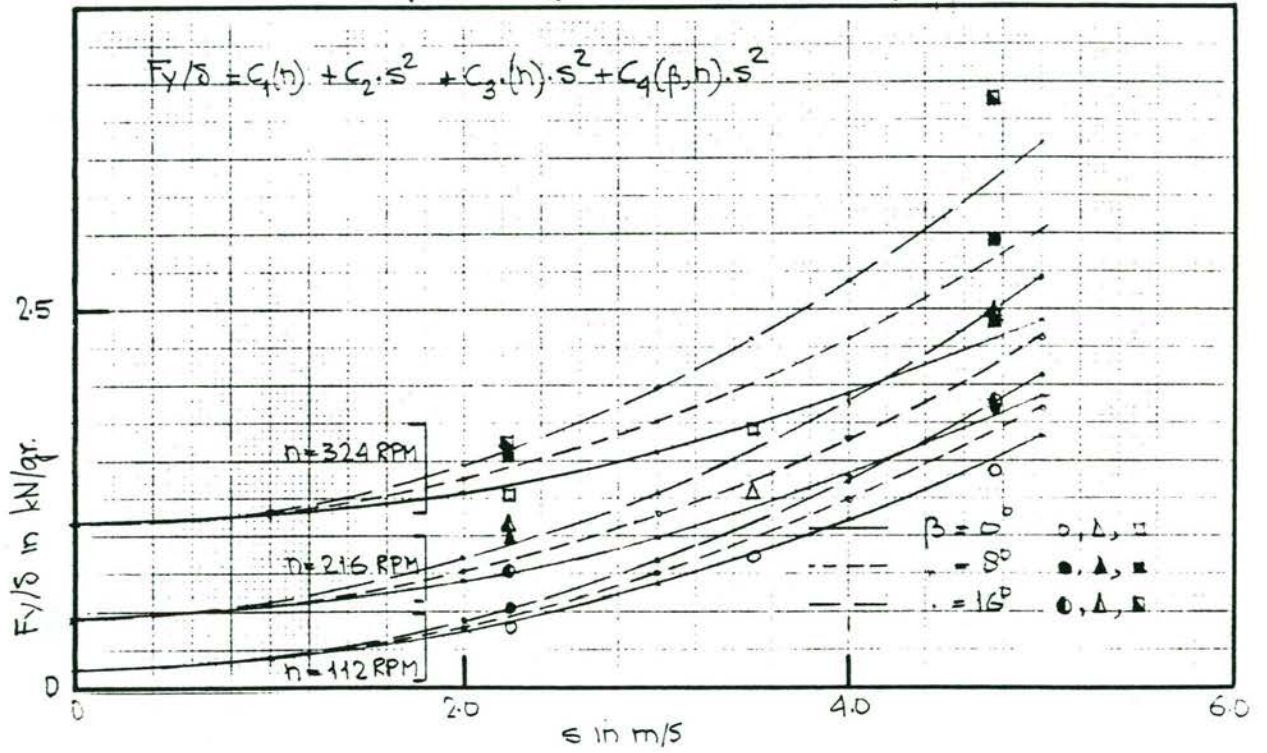
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_y = F_y(\delta) = Y_{\delta nn} \delta \cdot n^2 + Y_{\delta ss} \delta s^2 + Y_{\delta ssn} \delta s^2 n + Y_{\delta ssn} \eta \delta s^2 n / \beta$$

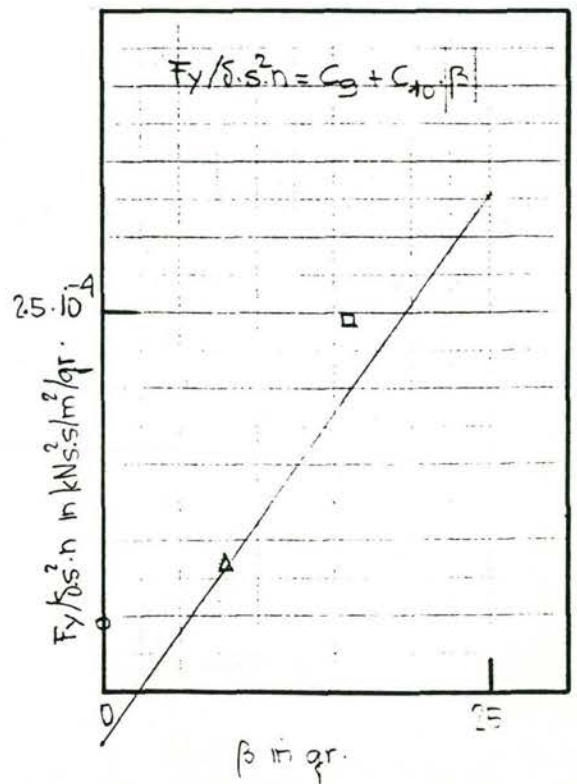
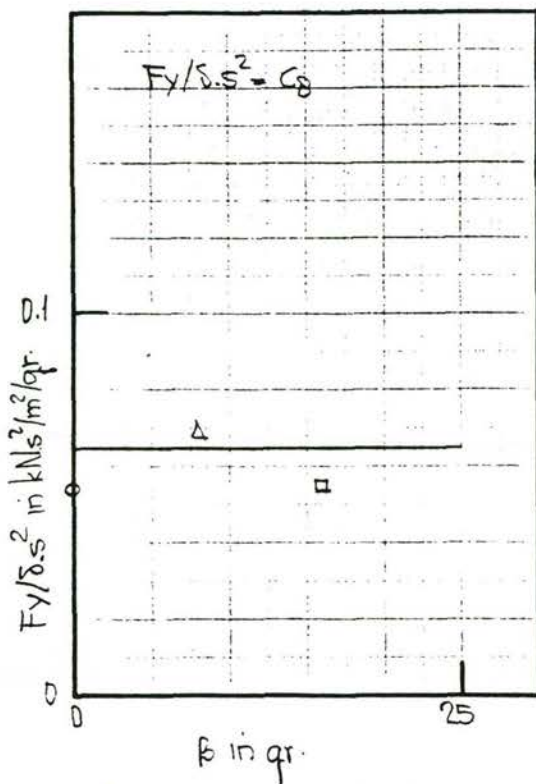
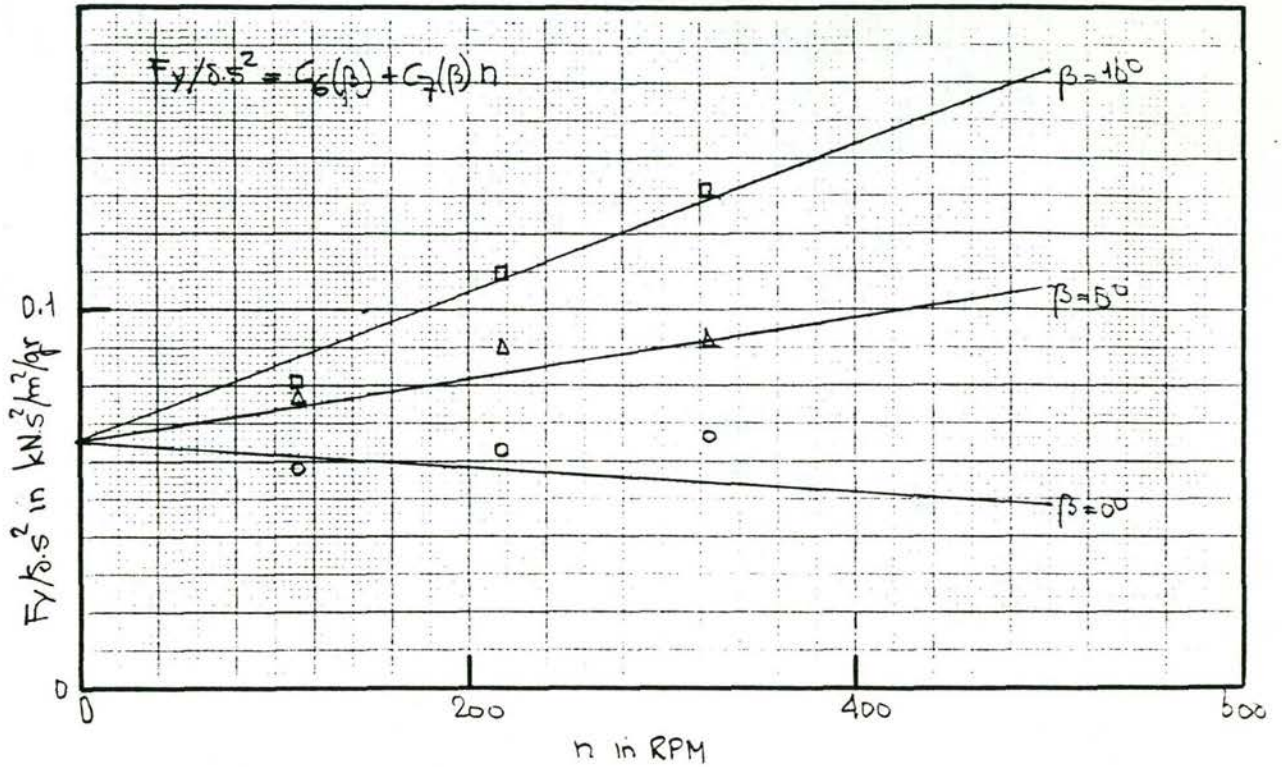
$$\hat{=} Y_{\delta nn} \delta n^2 + Y_{\delta uu} \delta u^2 + Y_{\delta uun} \delta u^2 n + Y_{\delta unv} \delta u n v$$



DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water



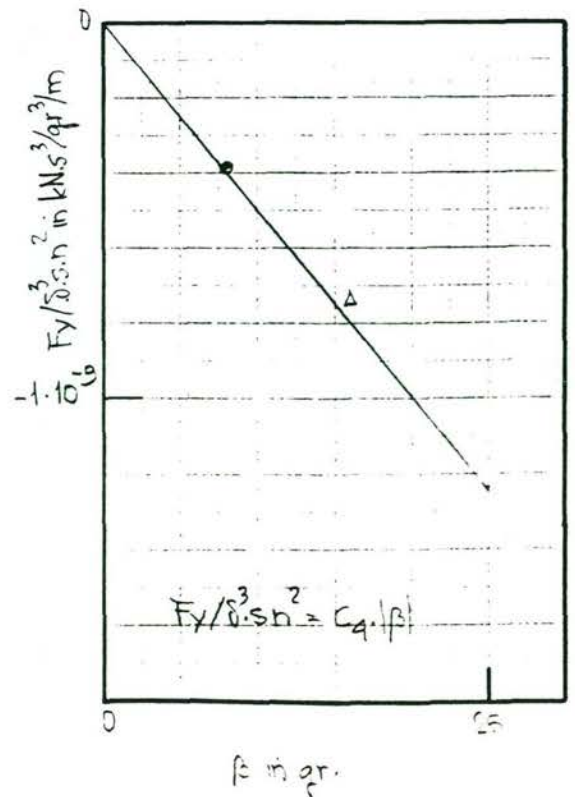
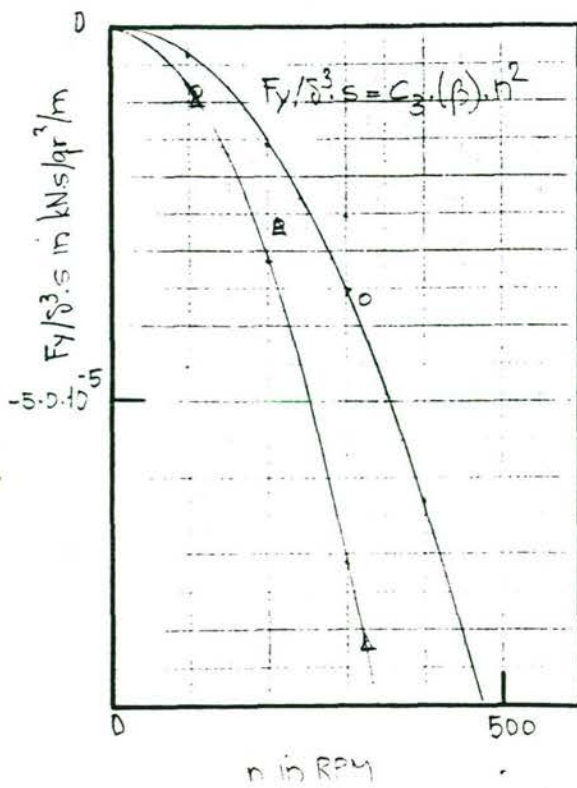
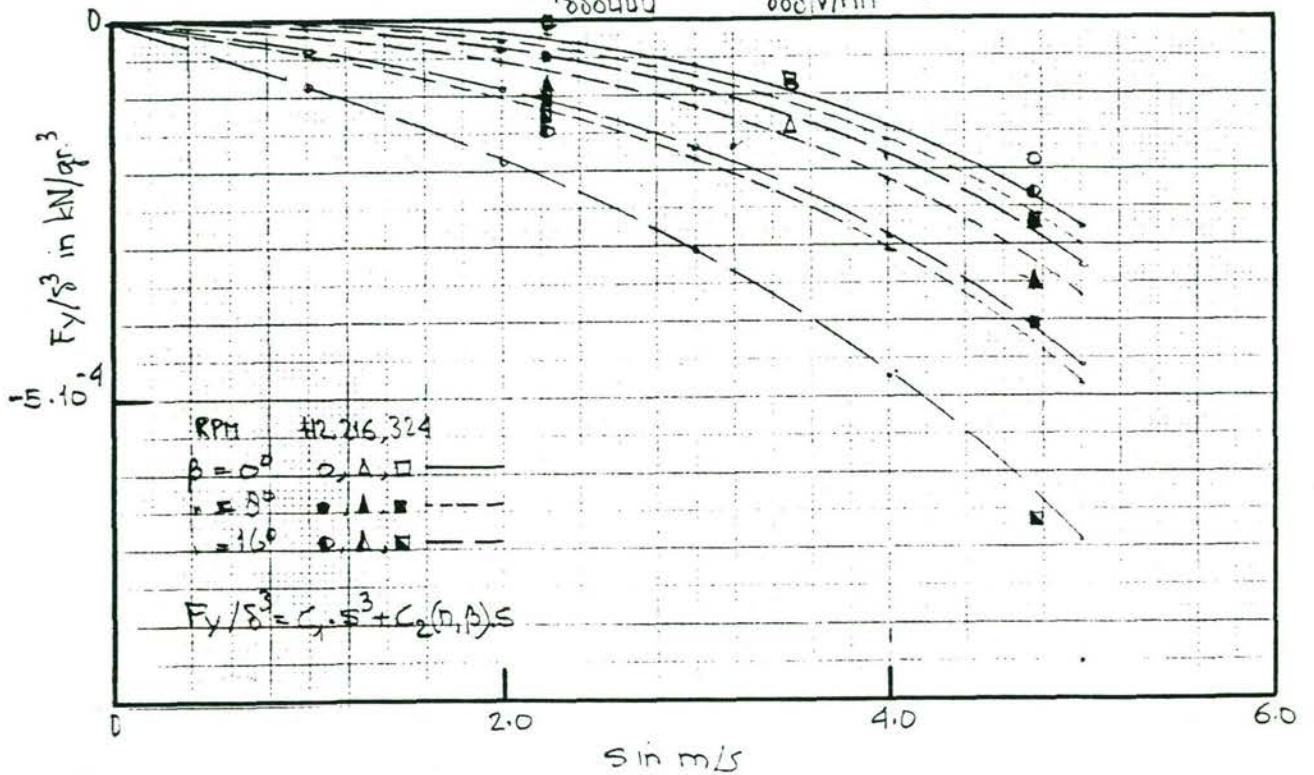
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast dreed water

$$F_y = F_y(\delta^3) = Y_{\delta\delta\delta\delta\delta\delta} \cdot \delta^3 \cdot s^3 + Y_{\delta\delta\delta\delta\delta\delta} \cdot \delta^3 \cdot s / \beta \cdot n^2$$

$$= Y_{\delta\delta\delta\delta\delta\delta} \cdot \delta^3 \cdot u^3 + Y_{\delta\delta\delta\delta\delta\delta} \cdot \delta^3 / v \cdot n^2$$



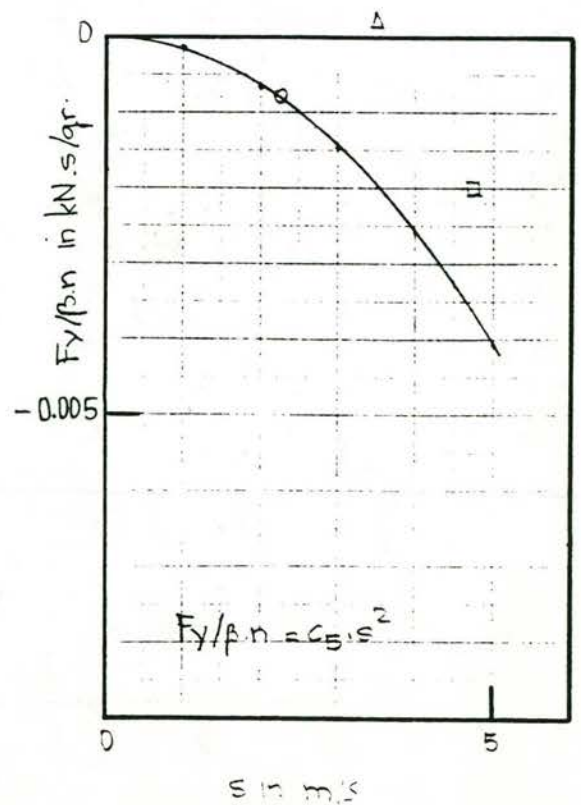
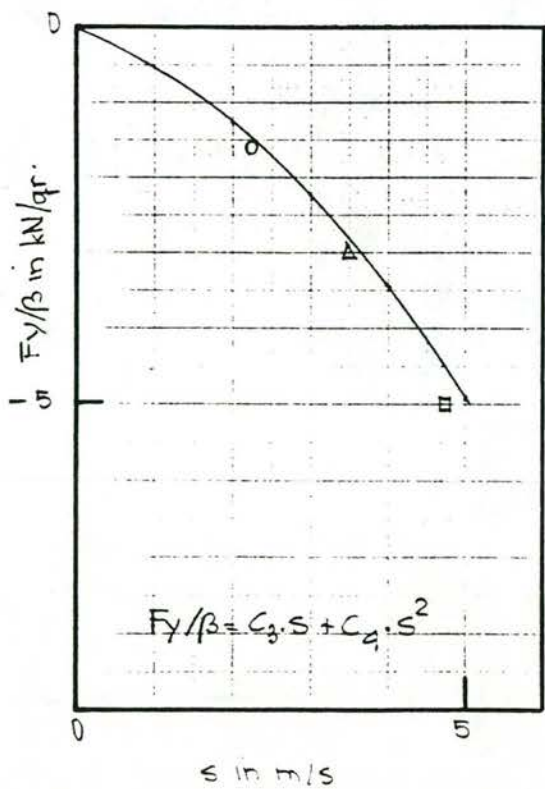
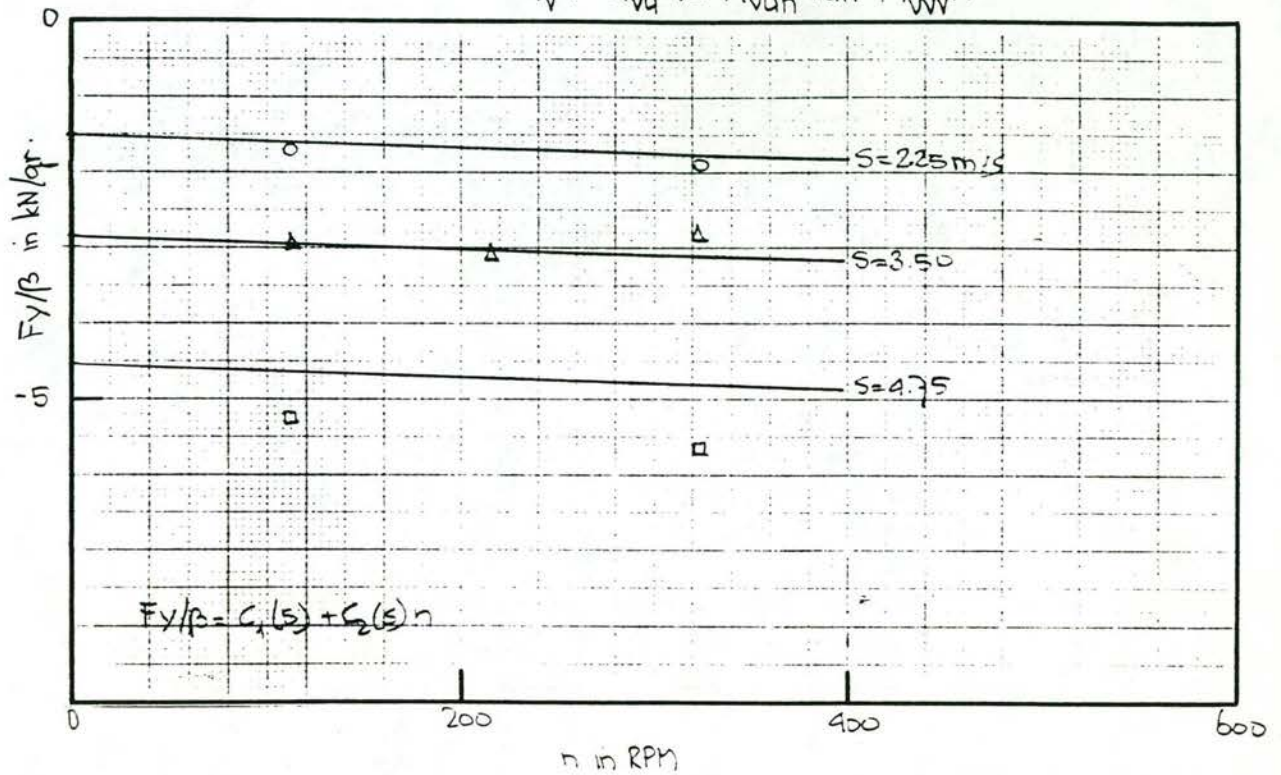
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_y(\delta=0) = F_y(\beta) + F_y(\beta^3) = Y_{\beta s} \cdot \beta \cdot s + Y_{\beta s s} \cdot \beta s^2 + Y_{\beta s s n} \cdot \beta s^2 n + Y_{\beta \beta s s s} \cdot \beta^3 s^3$$

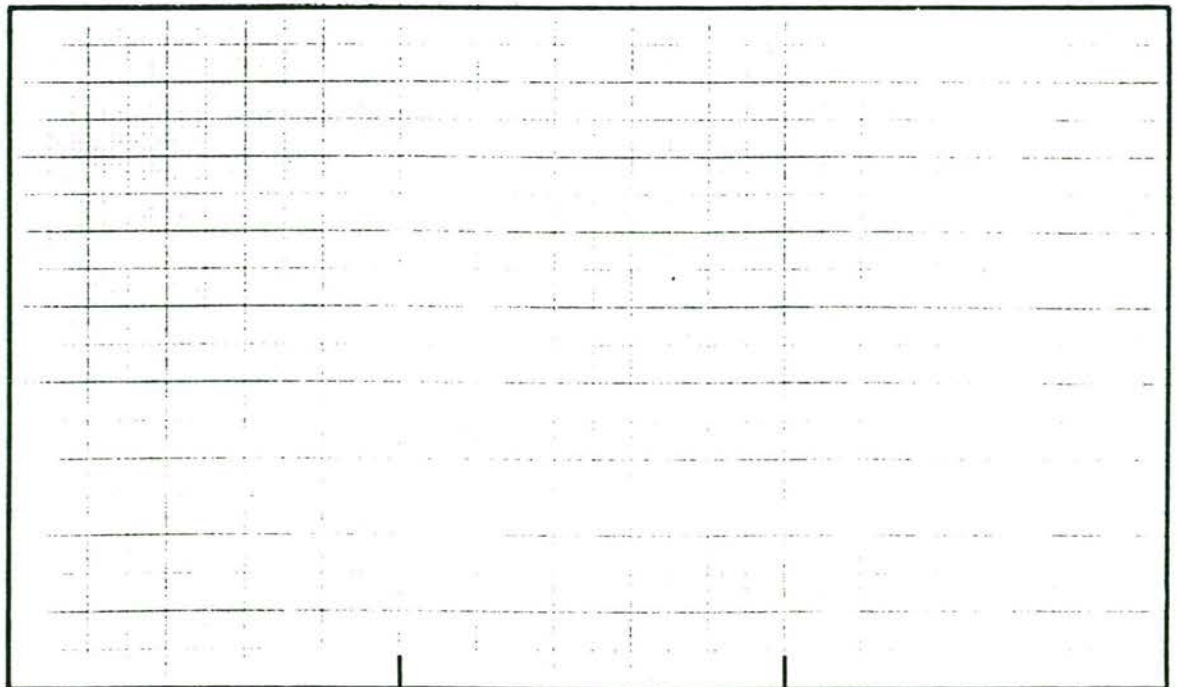
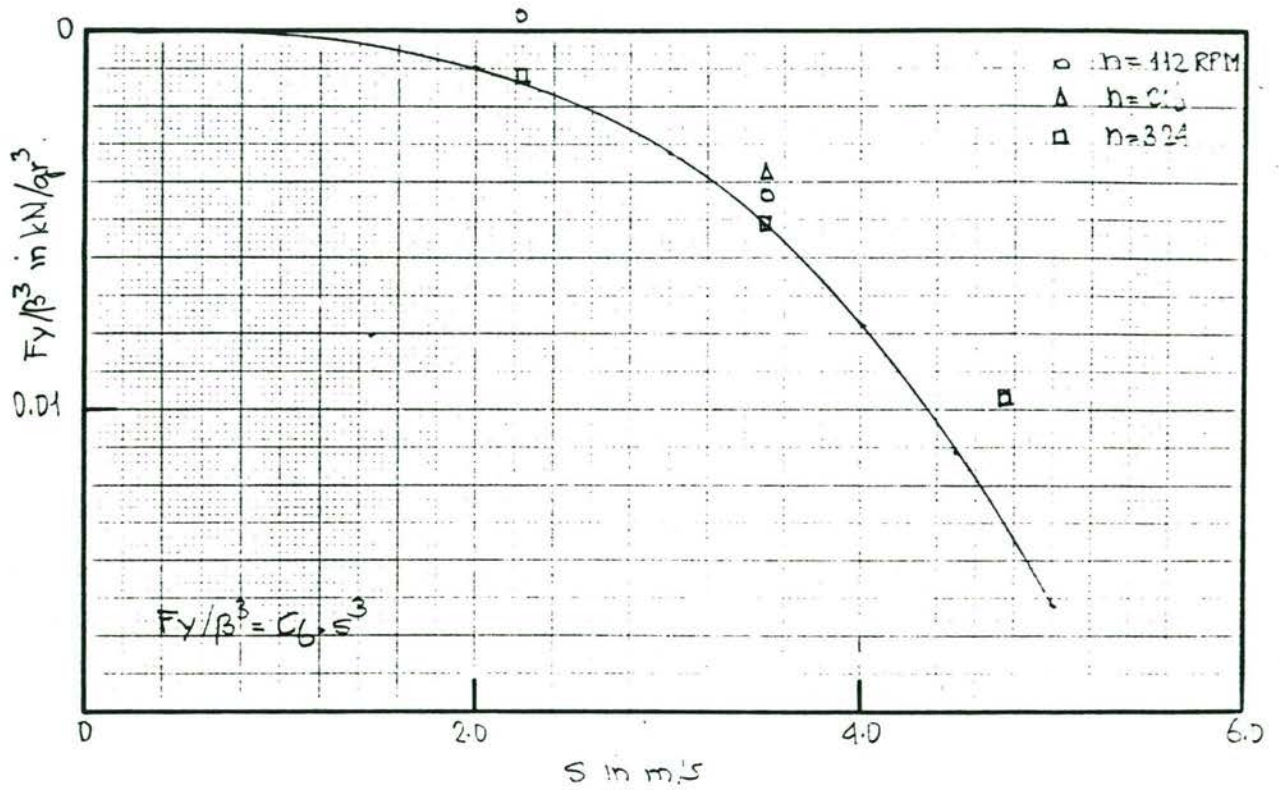
$$\hat{=} Y_v \cdot v + Y_{vu} \cdot vu + Y_{vun} \cdot vun + Y_{vw} \cdot v^3$$



DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water



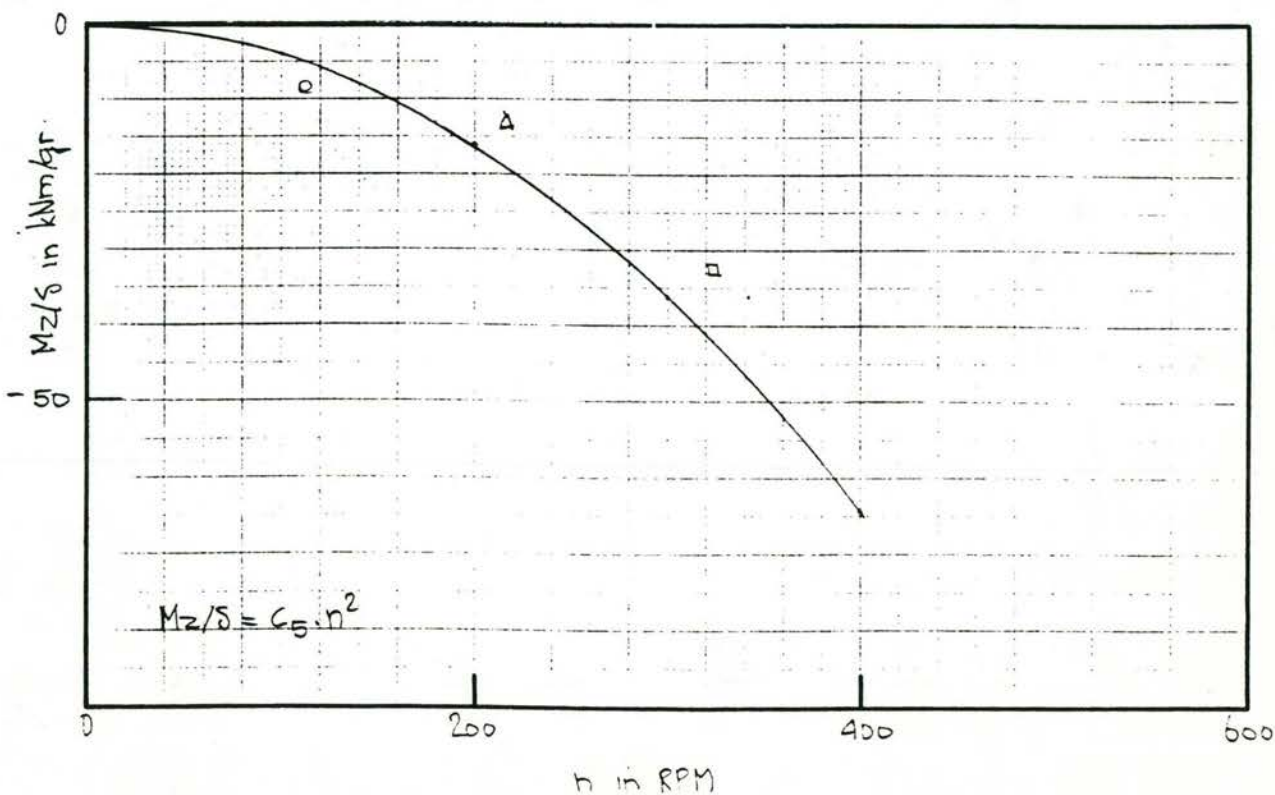
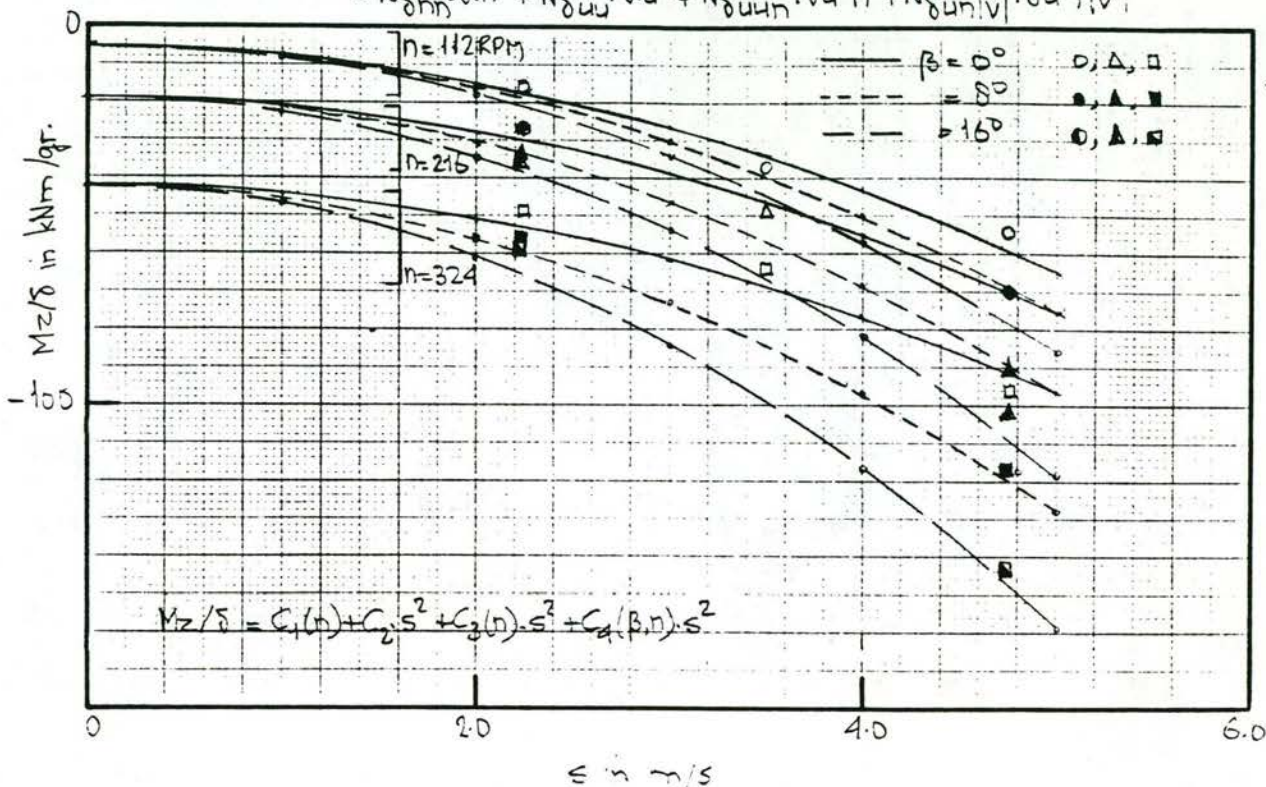
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-heme kanaal schip ballast, breed water

$$M_z = M_z(\xi) = N_{\delta nn} \cdot \delta \cdot n^2 + N_{\delta ss} \cdot \delta \cdot s^2 + N_{\delta ssn} \cdot \delta \cdot s^2 \cdot n + N_{\delta ssn|\beta|} \cdot \delta \cdot s^2 \cdot n \cdot |\beta|$$

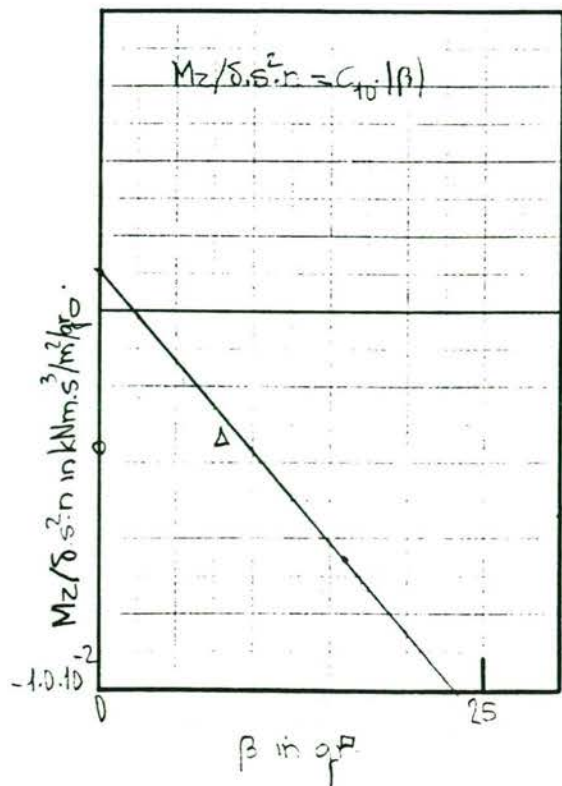
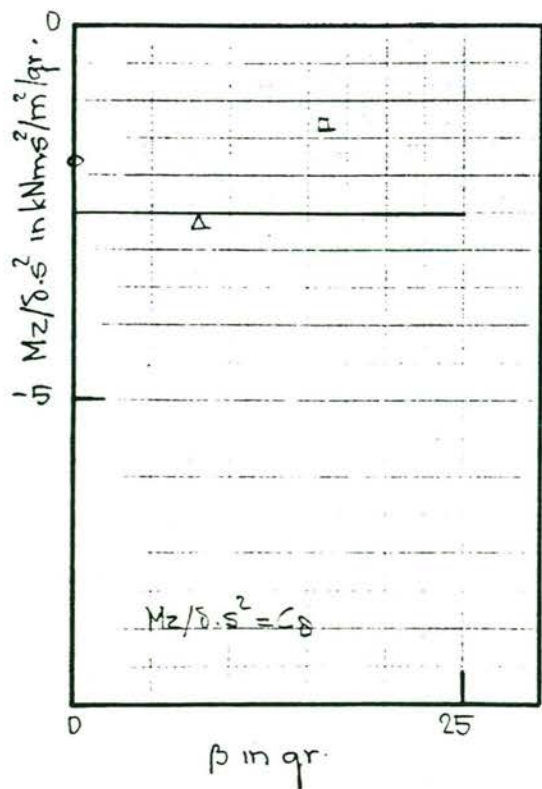
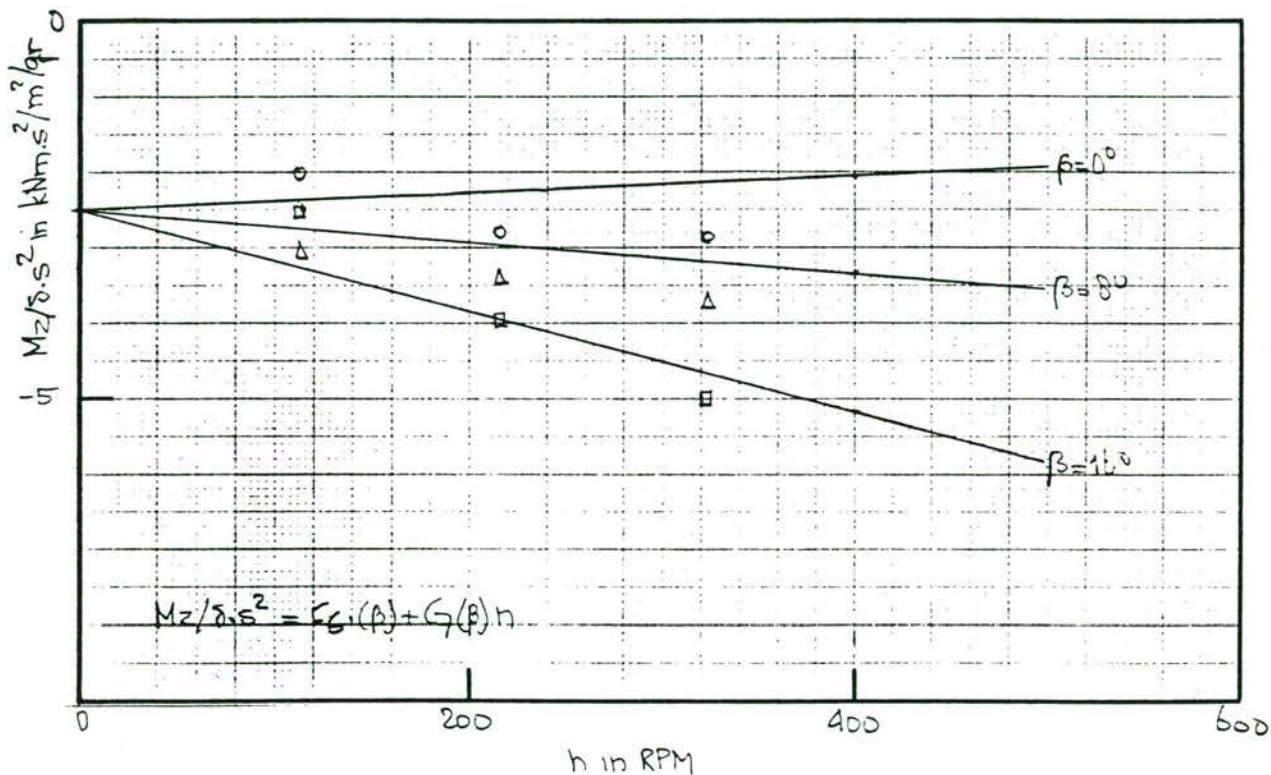
$$\hat{=} N_{\delta nn} \cdot \delta \cdot n^2 + N_{\delta uu} \cdot \delta \cdot u^2 + N_{\delta uun} \cdot \delta \cdot u^2 \cdot n + N_{\delta un|\beta|} \cdot \delta \cdot u^2 \cdot n \cdot |\beta|$$



DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn - herne kanaal schip ballast, breed water



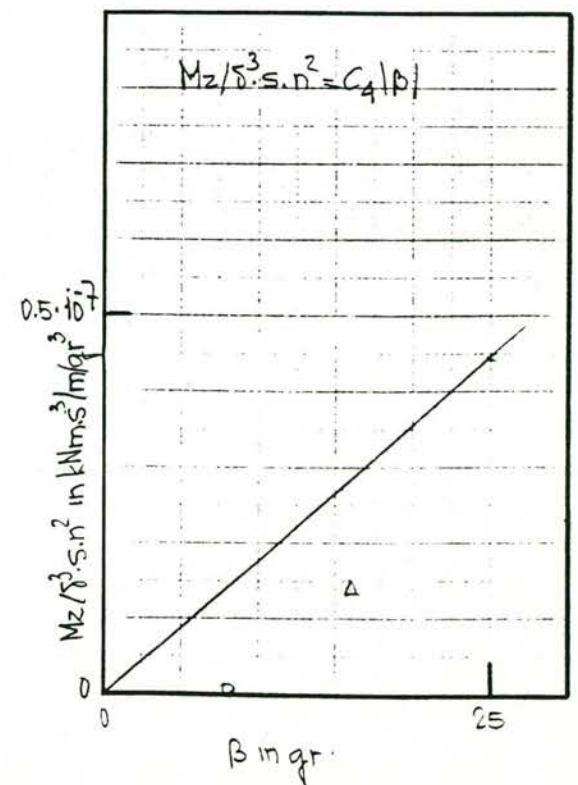
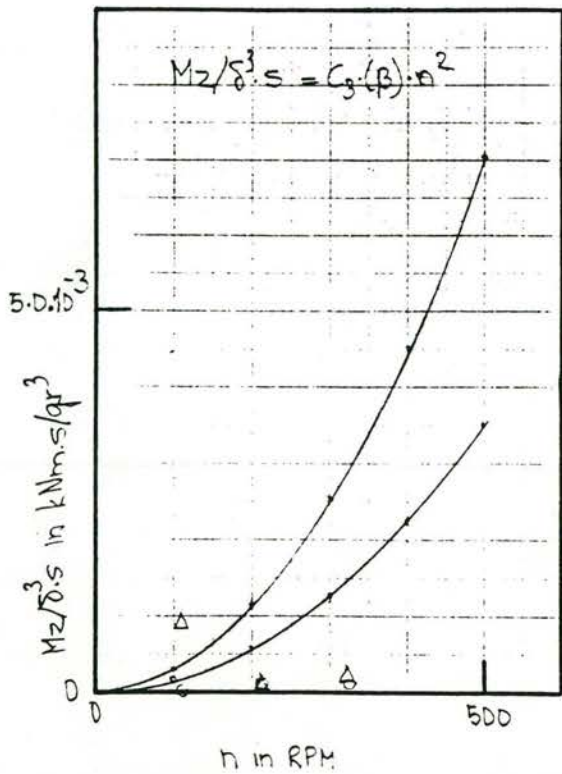
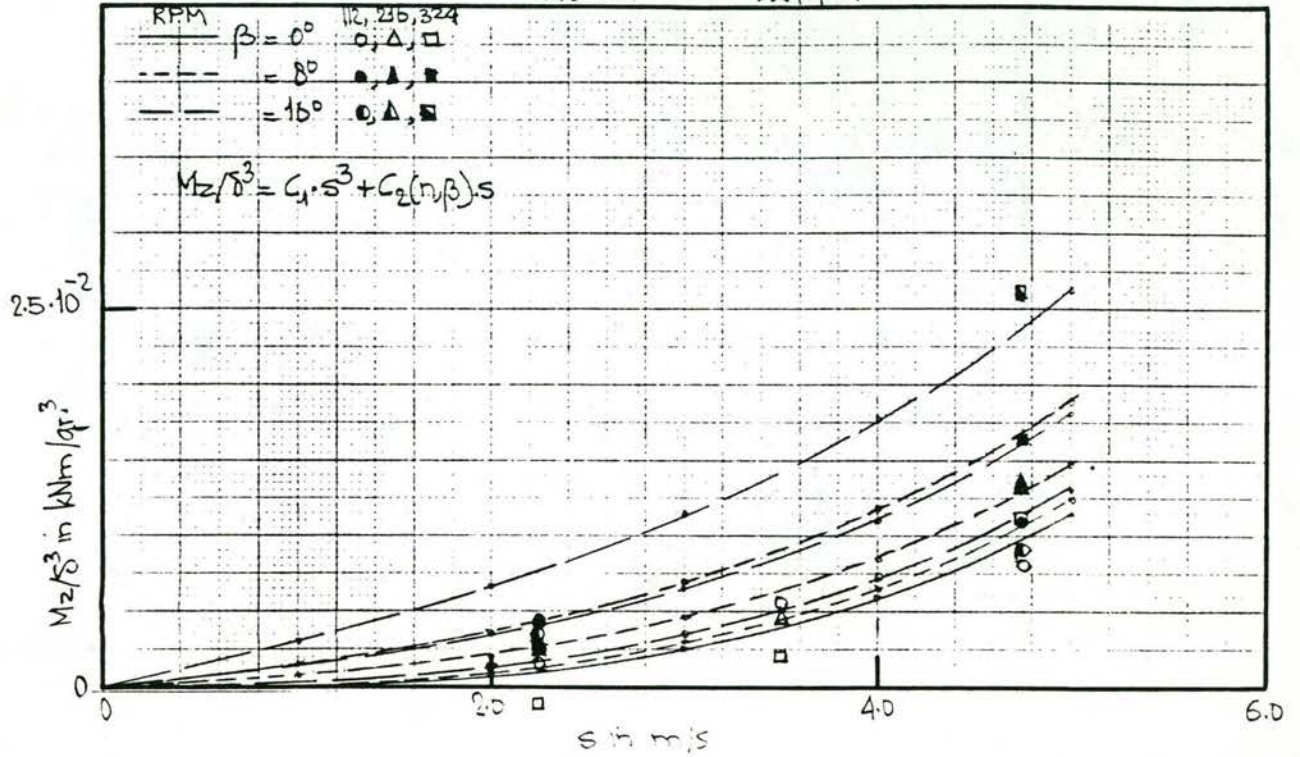
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$M_z = M_z(\delta^3) = N_{\delta\delta\delta s s s} \cdot \delta^3 \cdot s^3 + N_{\delta\delta\delta s|\beta|n n} \cdot \delta^3 \cdot s|\beta| \cdot n^2$$

$$= N_{\delta\delta\delta u u u} \cdot \delta^3 \cdot u^3 + N_{\delta\delta\delta |v|n n} \cdot \delta^3 |v| \cdot n^2$$



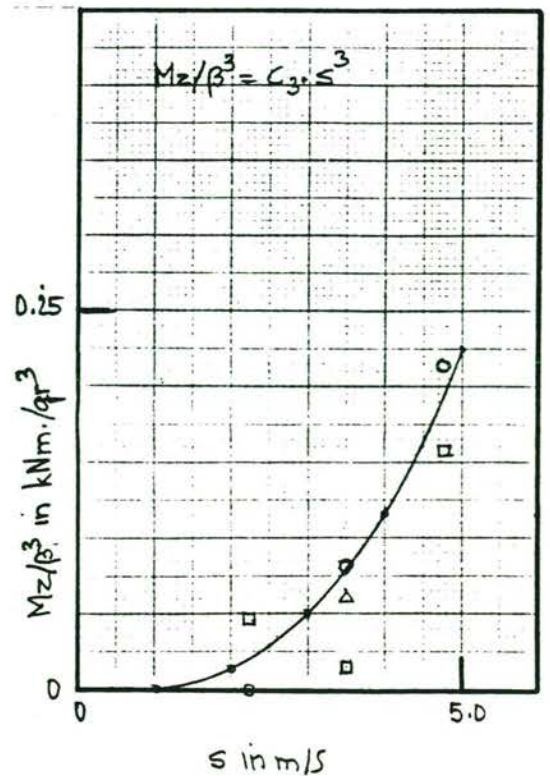
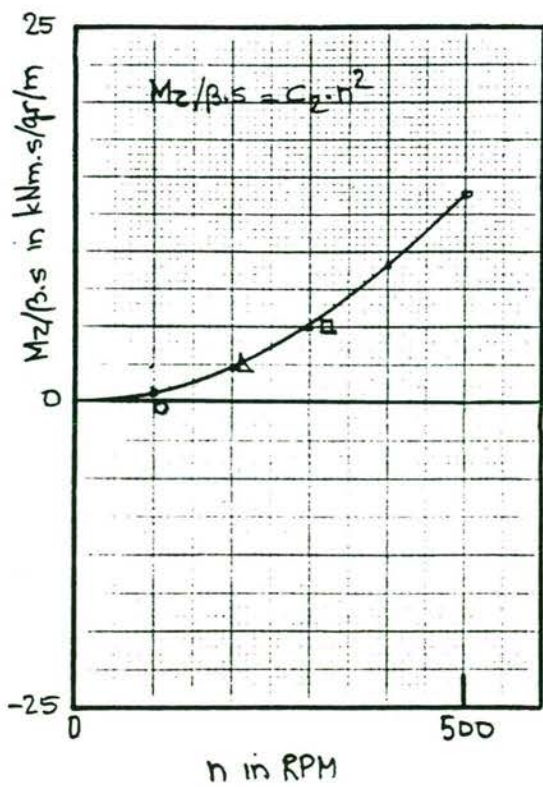
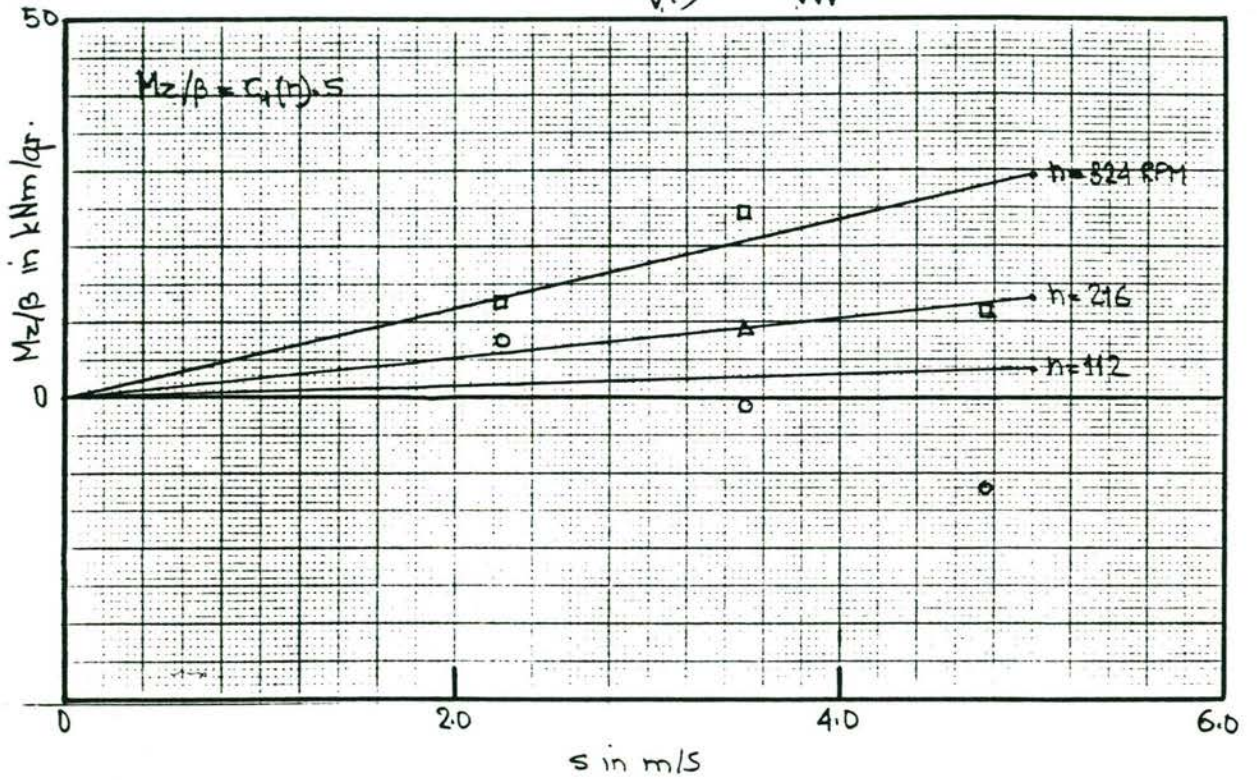
DVK Projekt Windhinder

COEFFICIENTEN UIT STATISCHE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$M_z(\delta=0) = M_z(\beta) + M_z(\beta^3) = N_{\beta}(n) \cdot s + N_{\beta\beta\beta} \cdot s^3$$

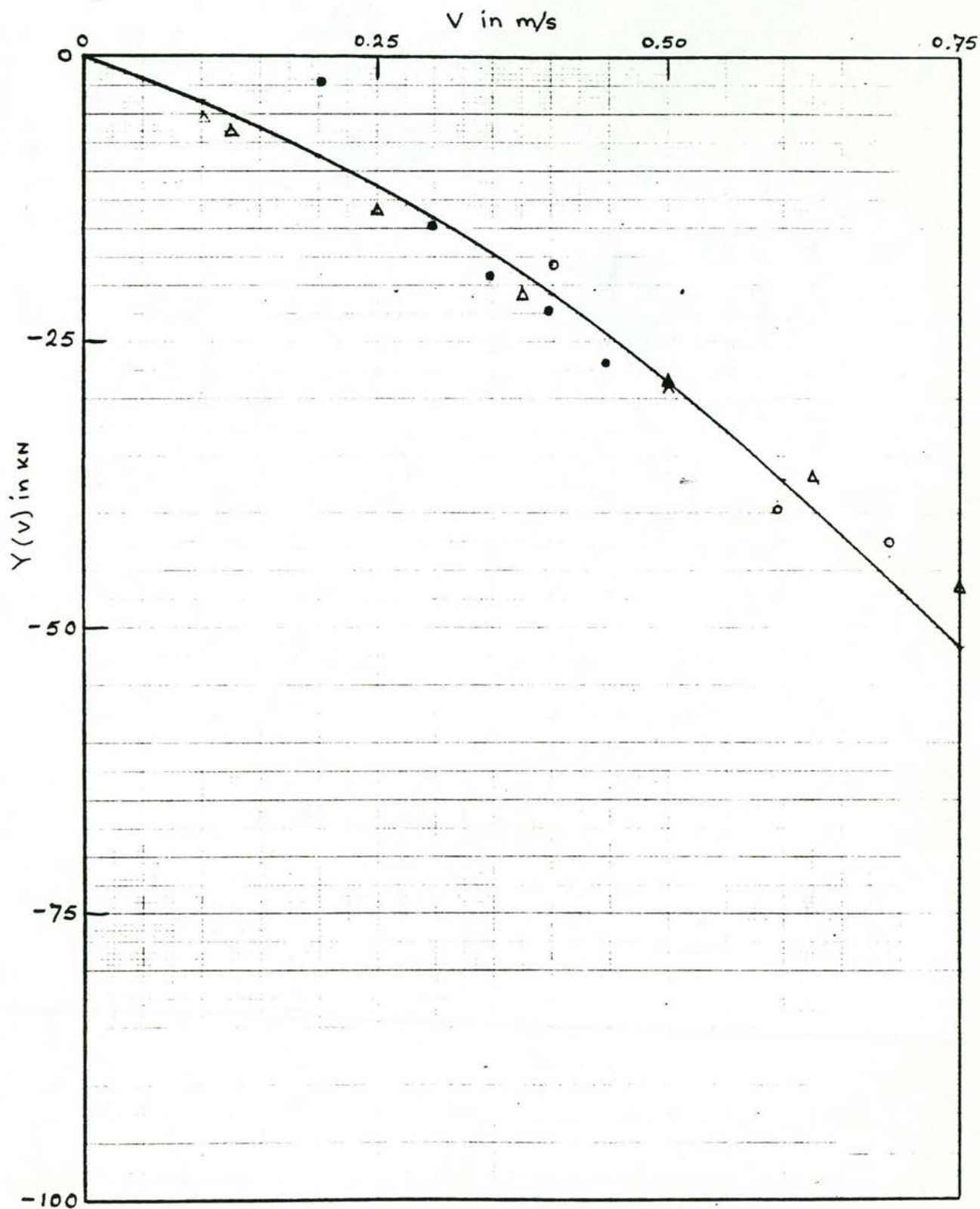
$$\hat{=} N_{\beta}(n) \cdot v + N_{\beta\beta\beta} \cdot v^3$$



DVK Projekt Windhinder
rijn-herne: ballast, breed water

VERZET OSCILLATIE PROEVEN

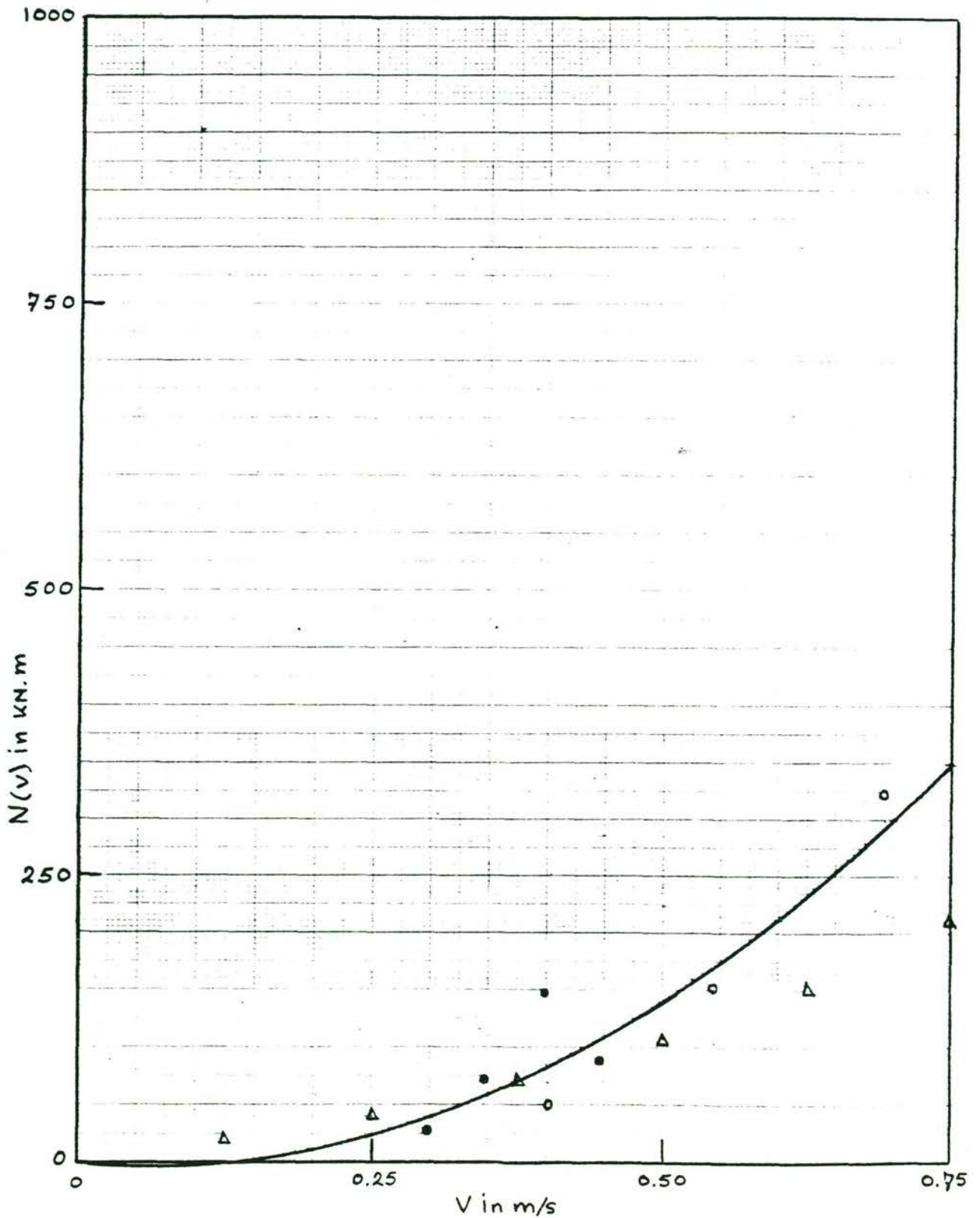
snelheid : $U = 3.50 \text{ m/s}$
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○
 Δ vgl met statische proeven



DVK Projekt Windhinder
rijn-herne: ballast, breed water

VERZET OSCILLATIE PROEVEN

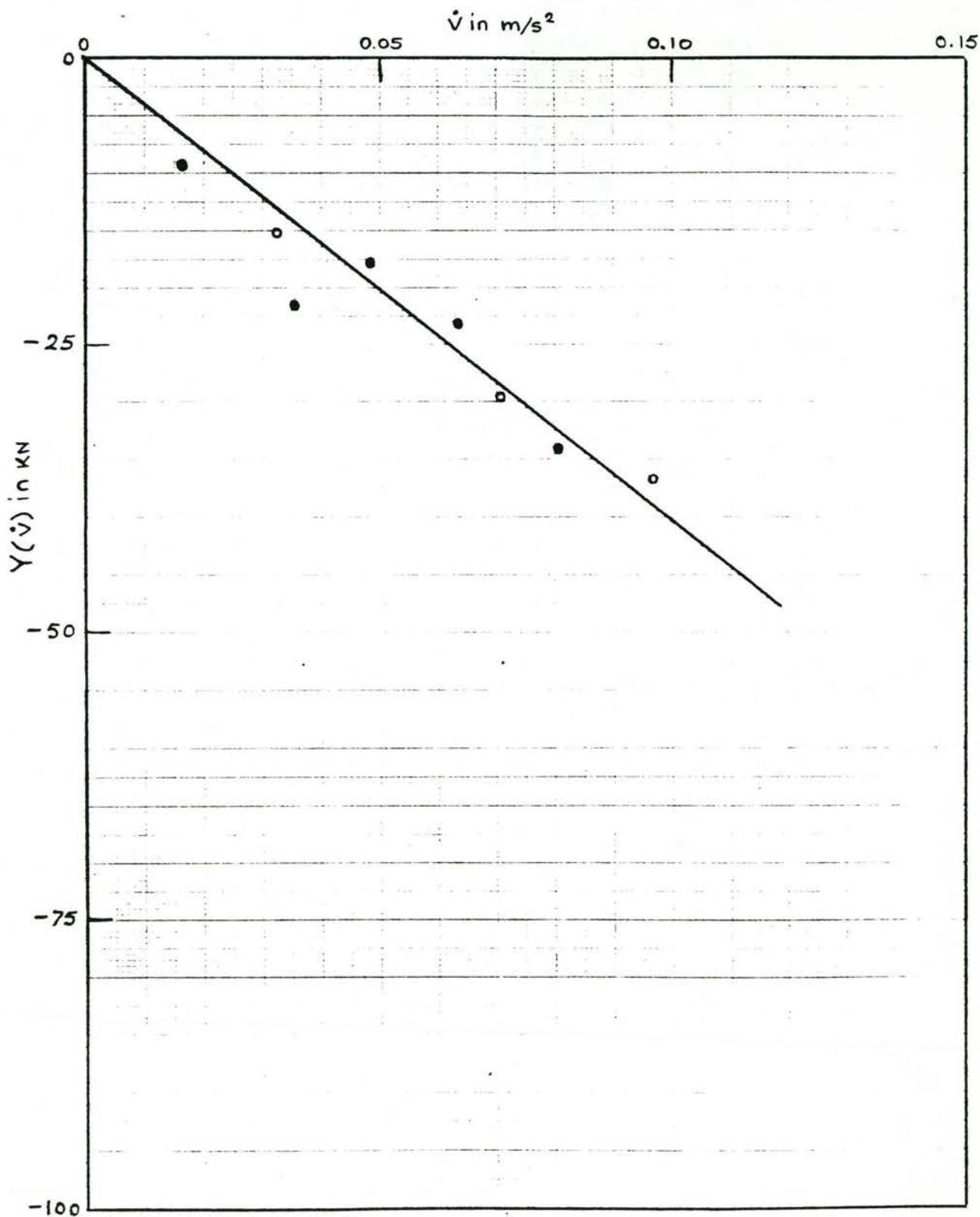
snelheid : U = 3.50 m/s
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○
 Δ vgl met statische proeven



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

VERZET OSCILLATIE PROEVEN

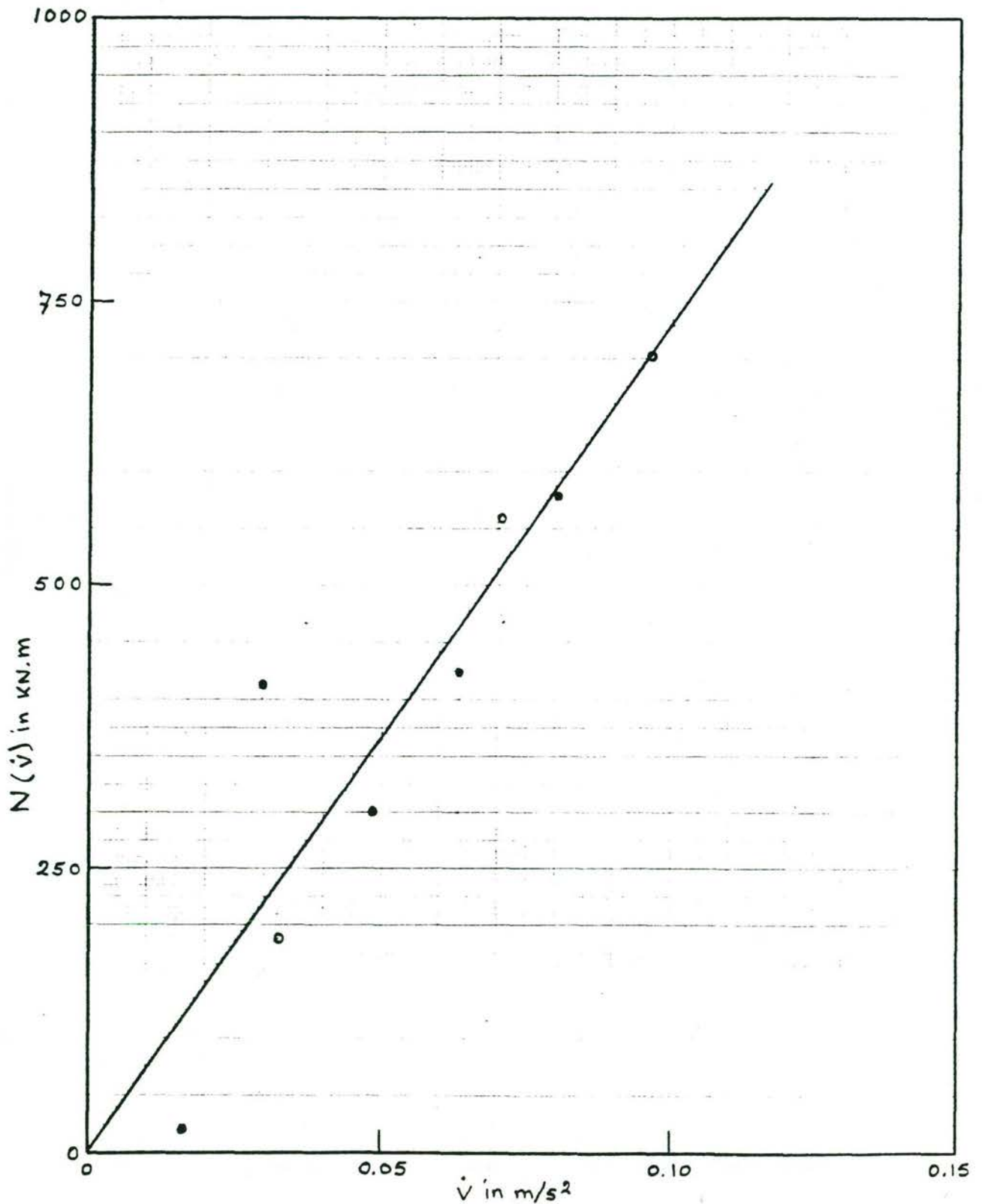
snelheid : U= 3.50 m/s
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

VERZET OSCILLATIE PROEVEN

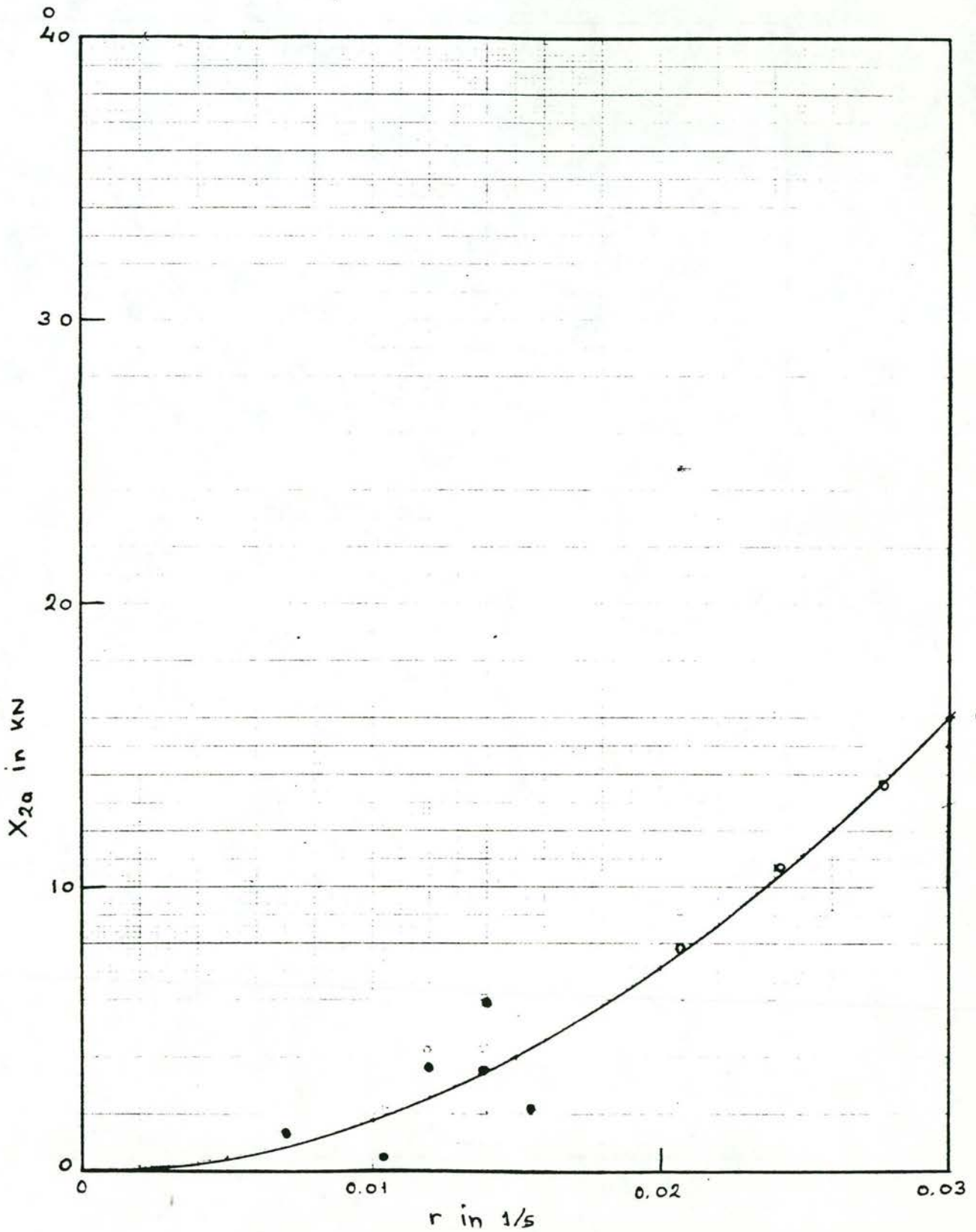
snelheid : U= 3.50 m/s
 amplitude 2.50 meter : ●
 amplitude 5.00 meter : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

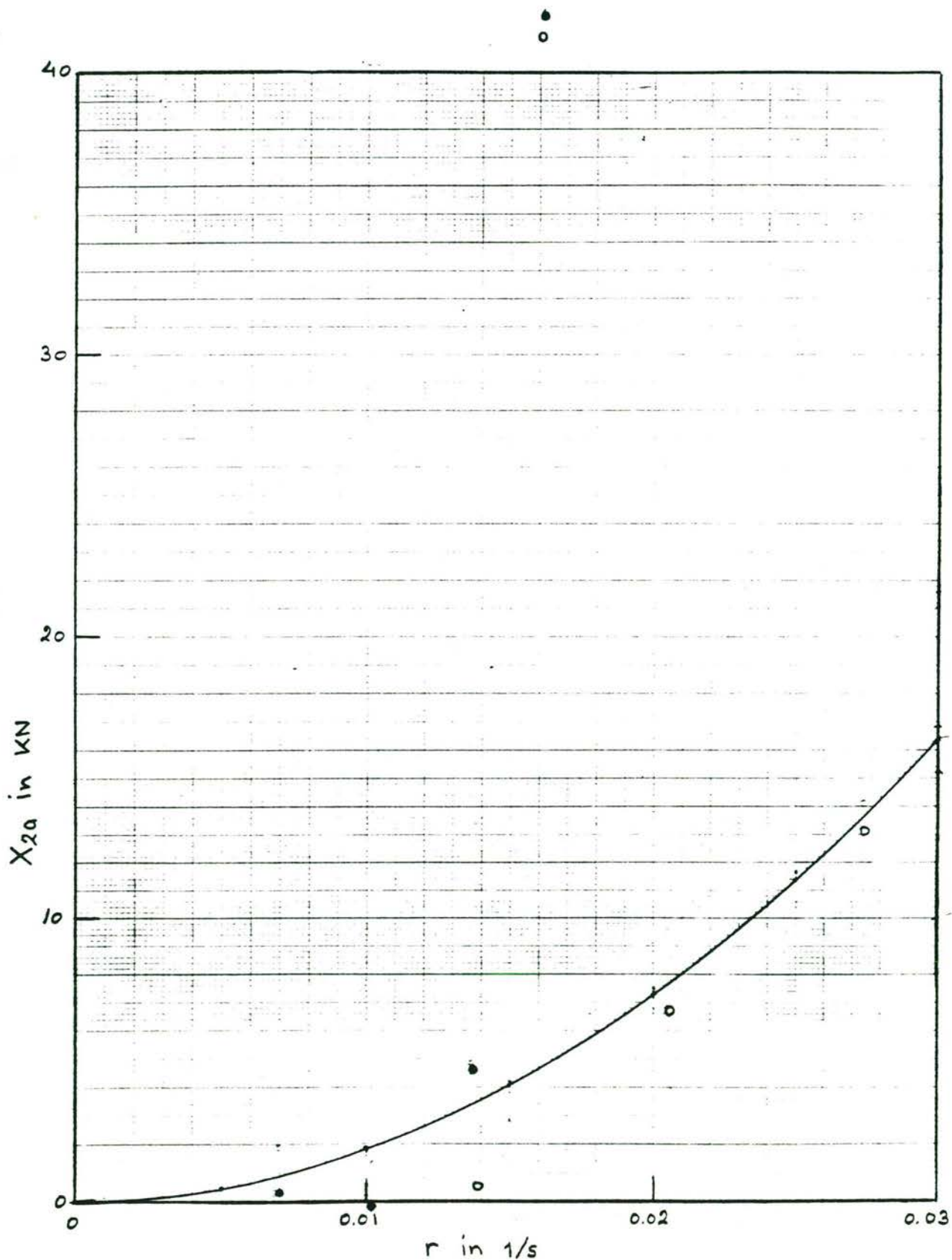
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

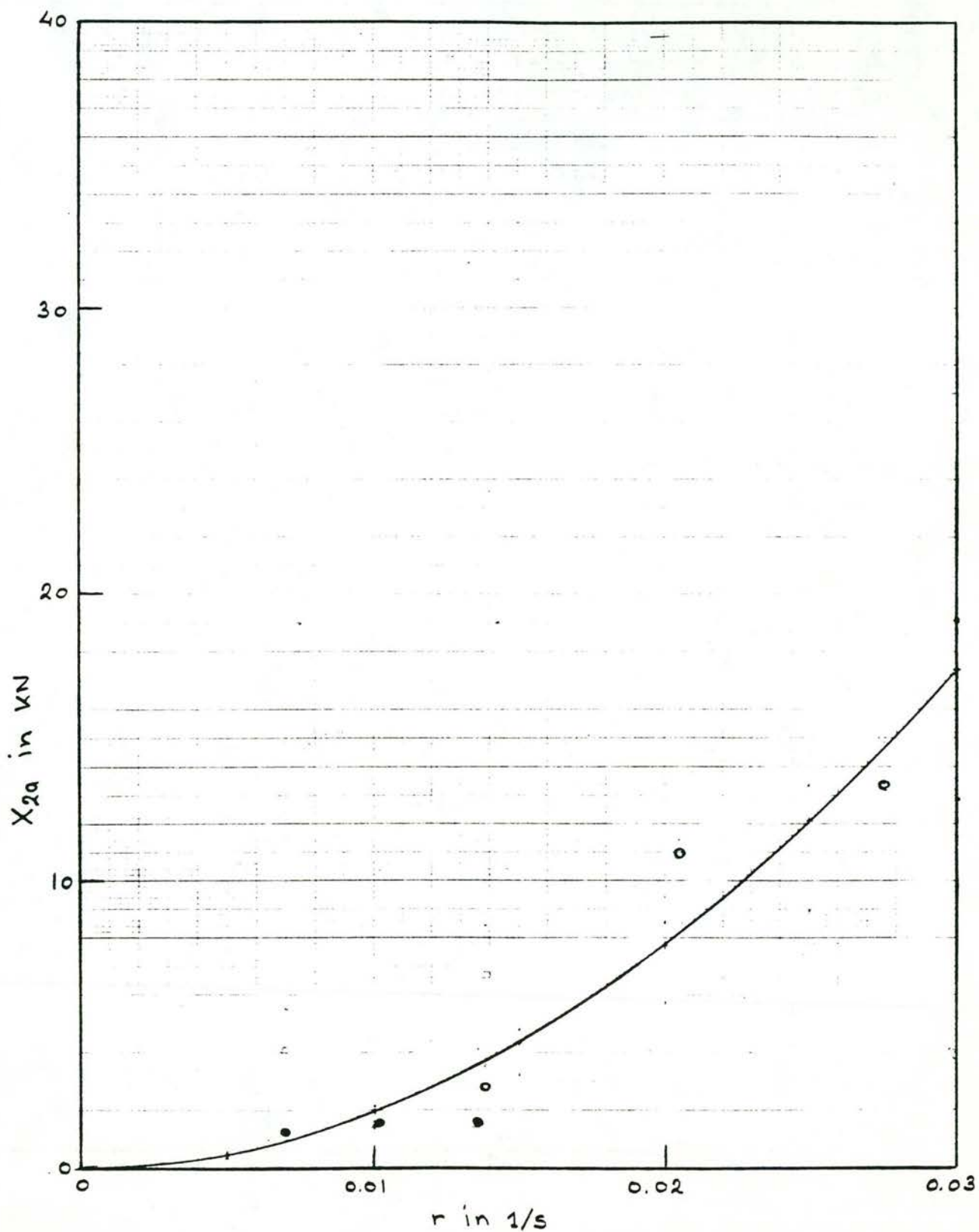
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

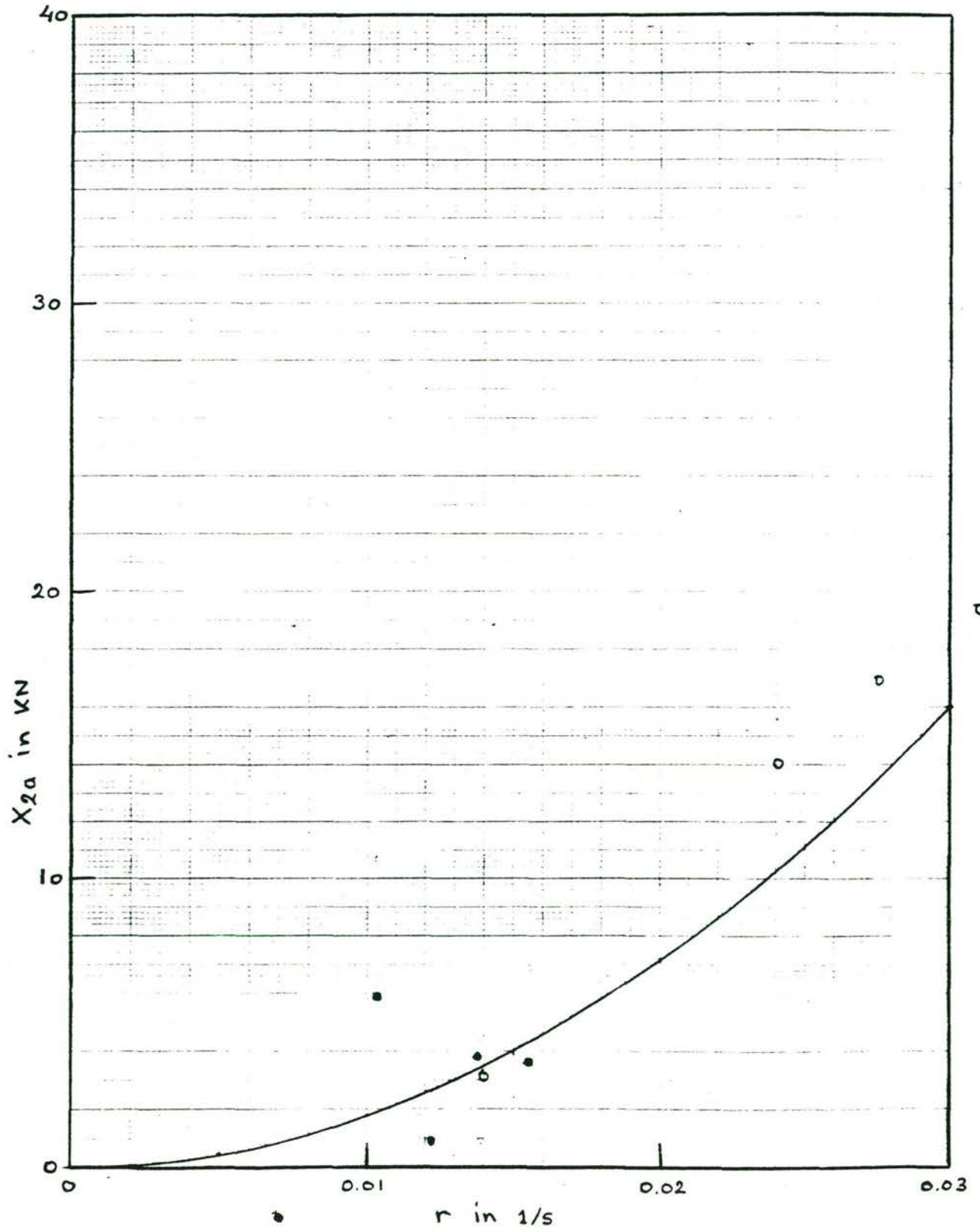
drifthoek : B= 16 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

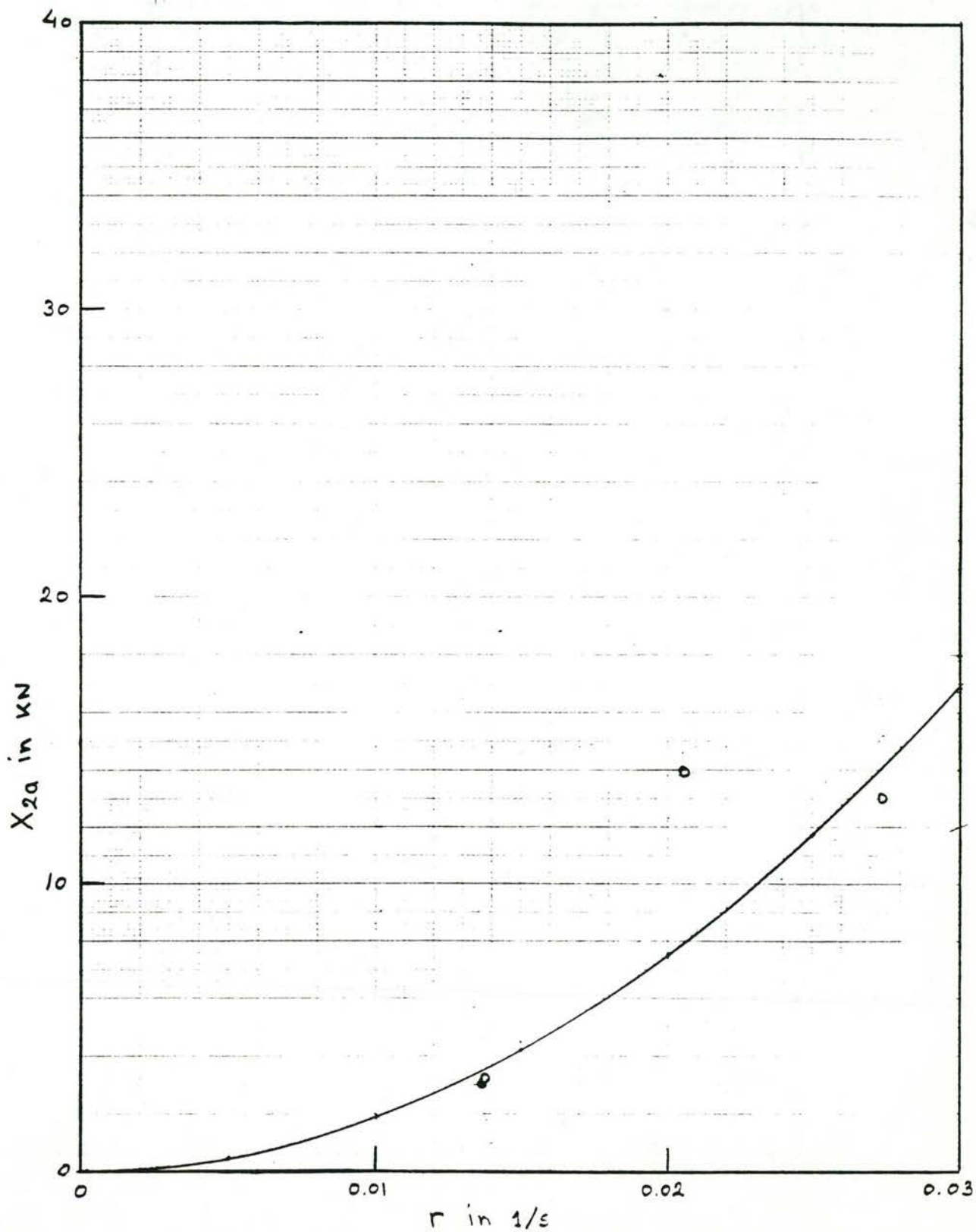
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

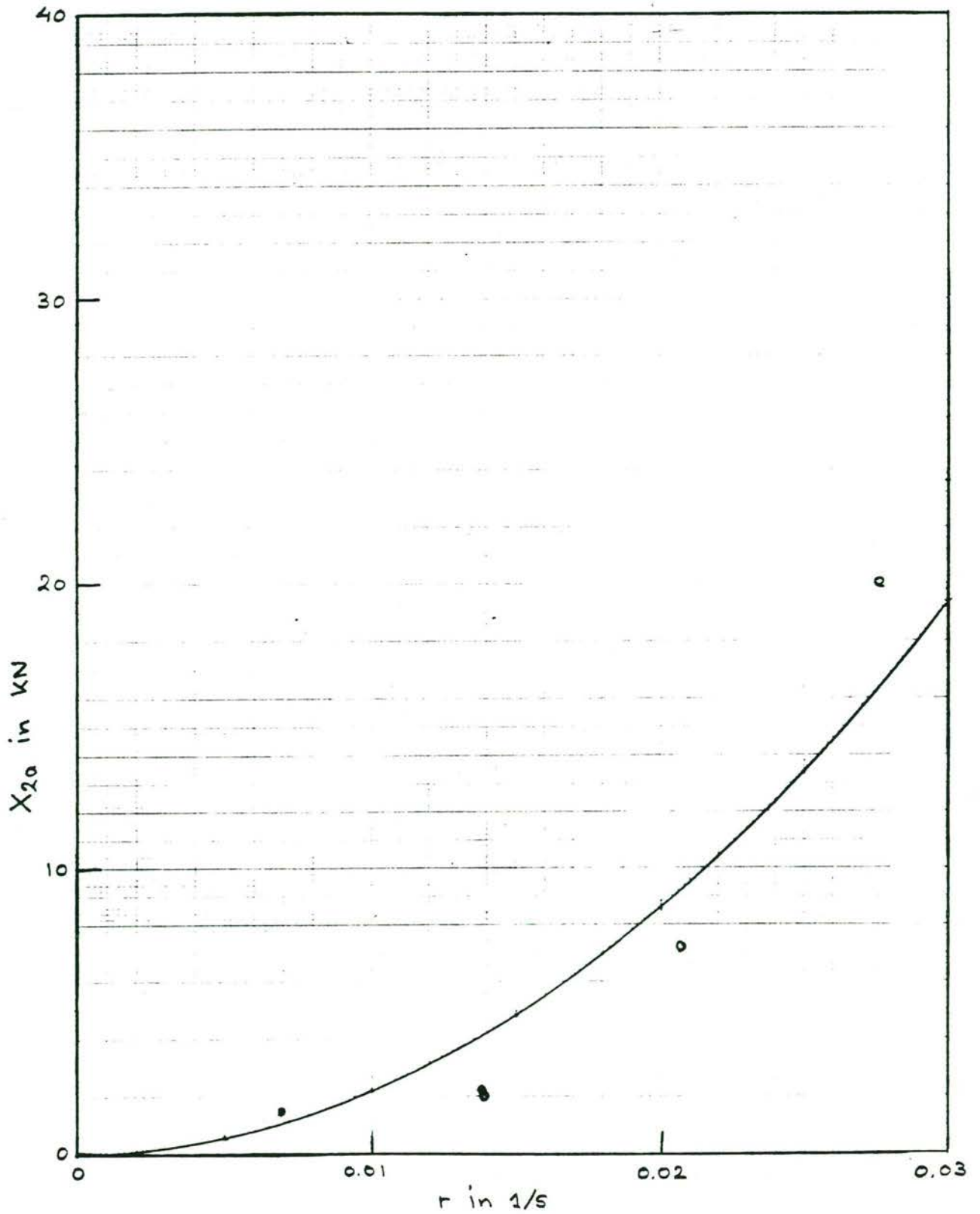
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

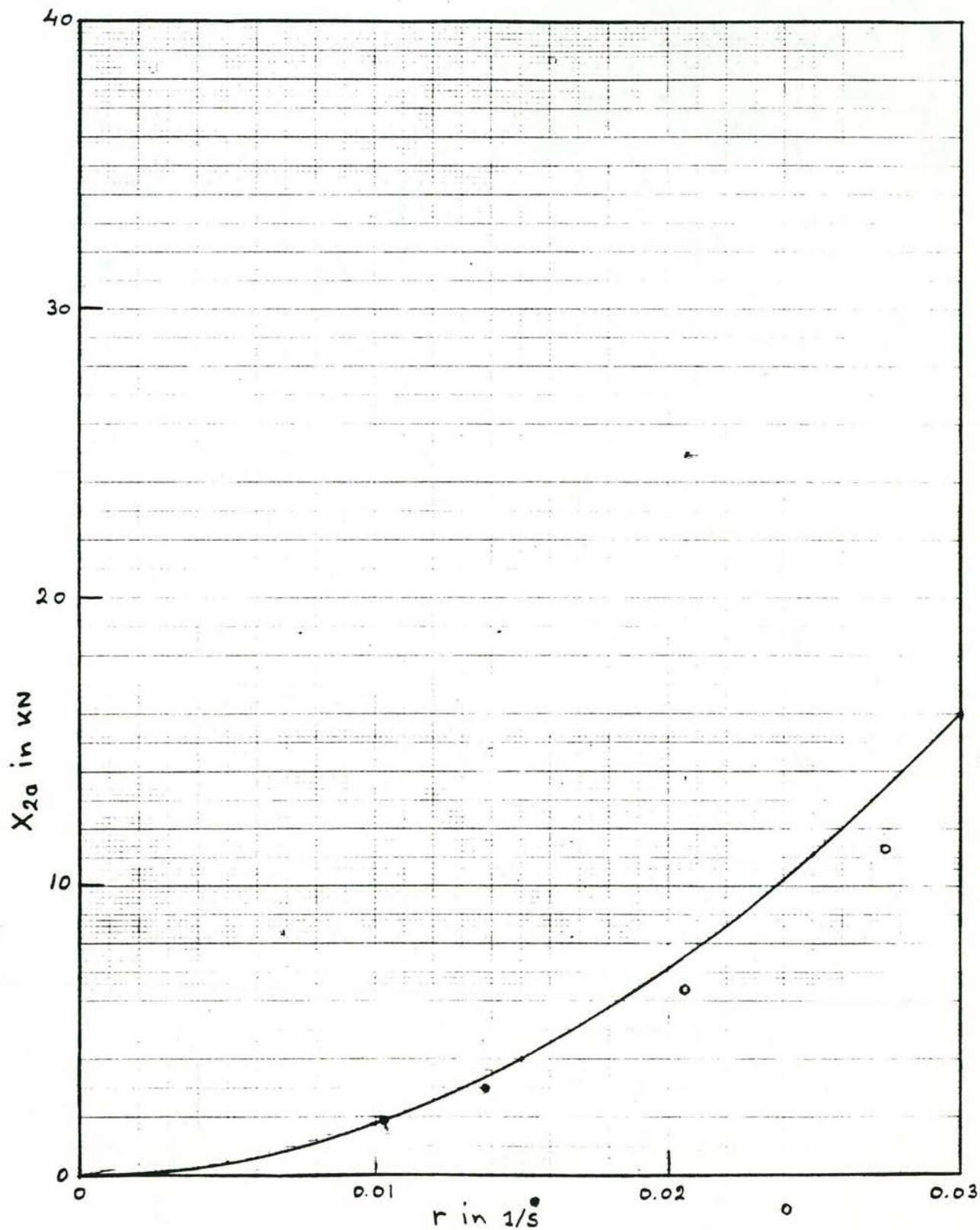
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

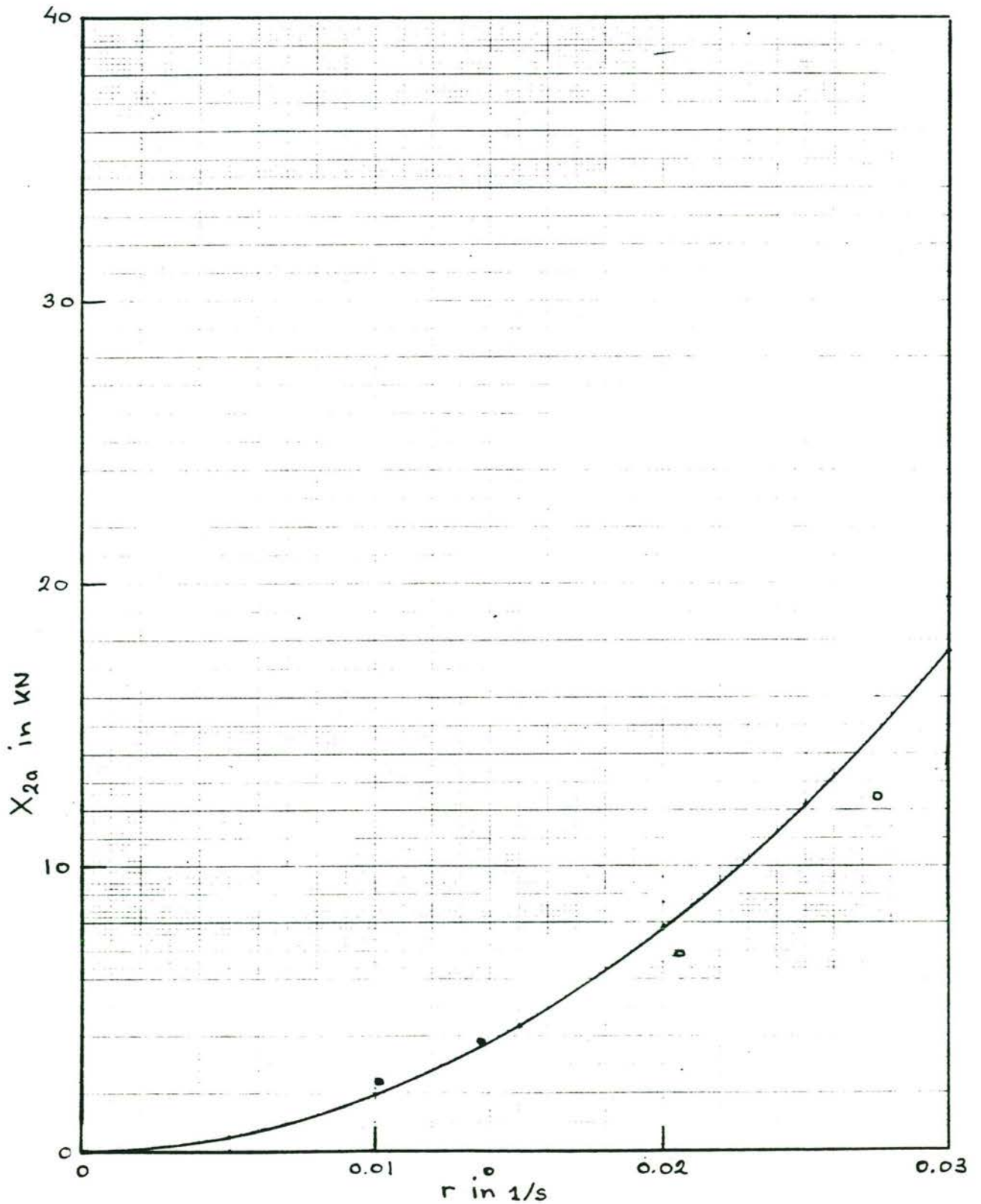
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

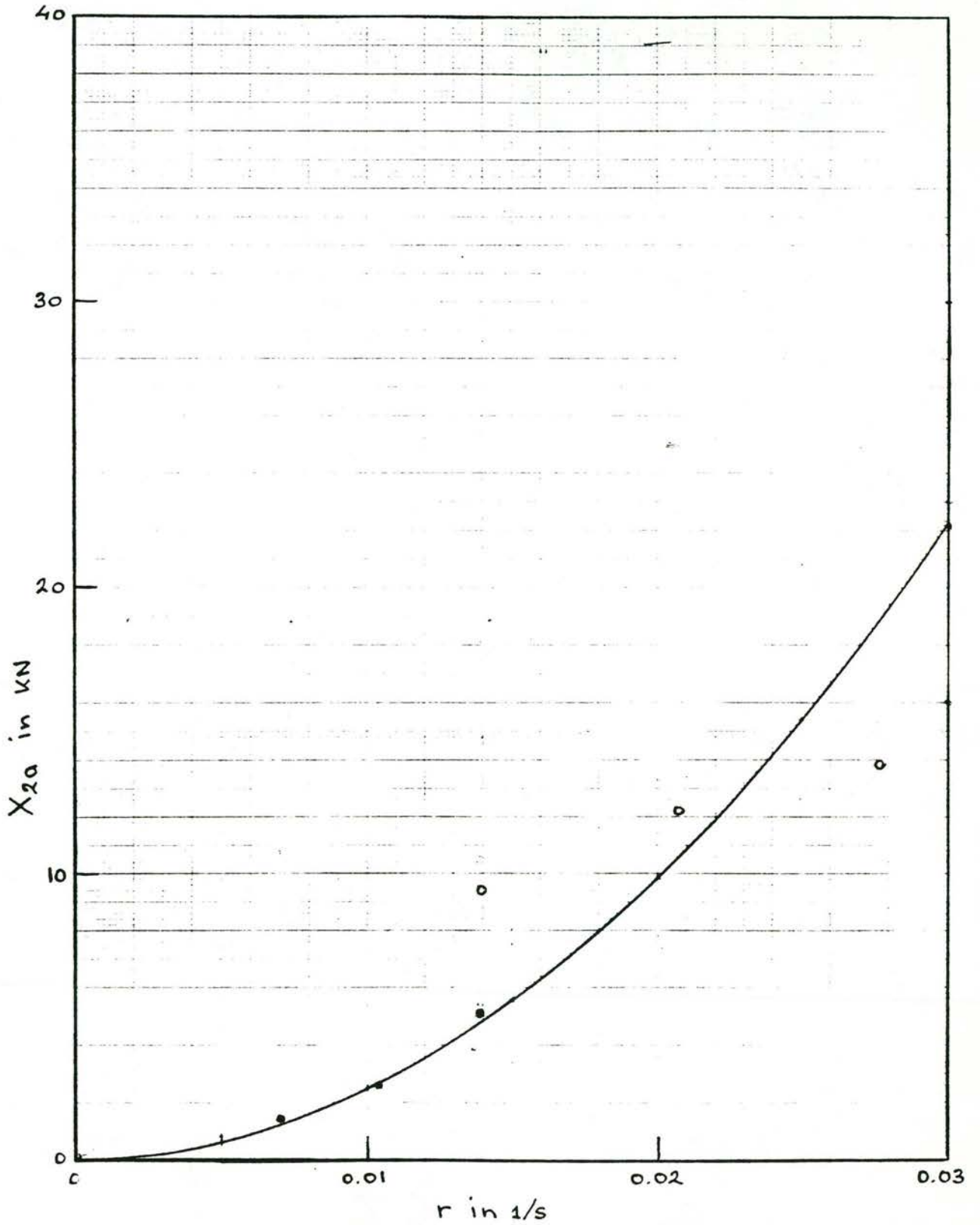
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

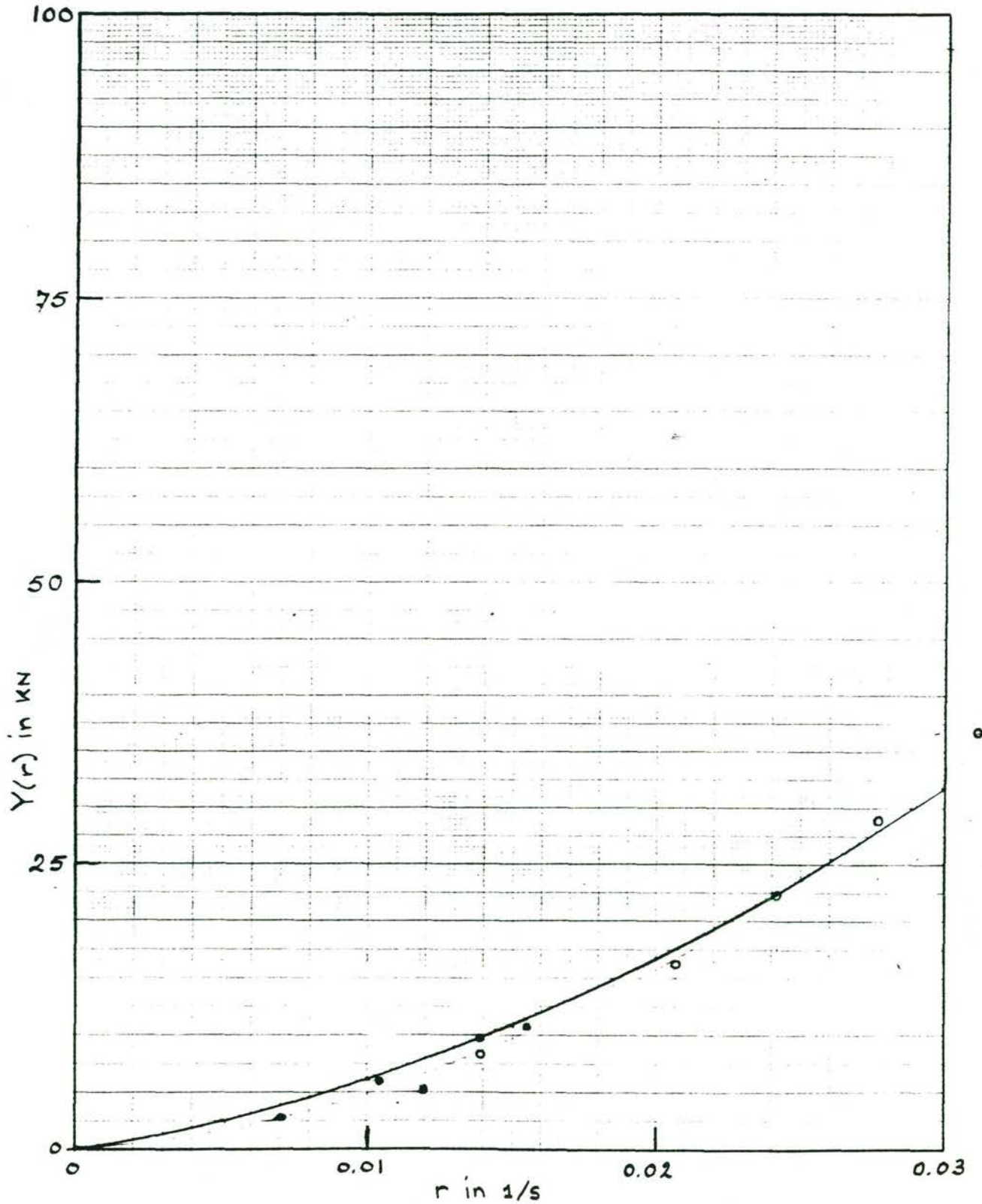
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

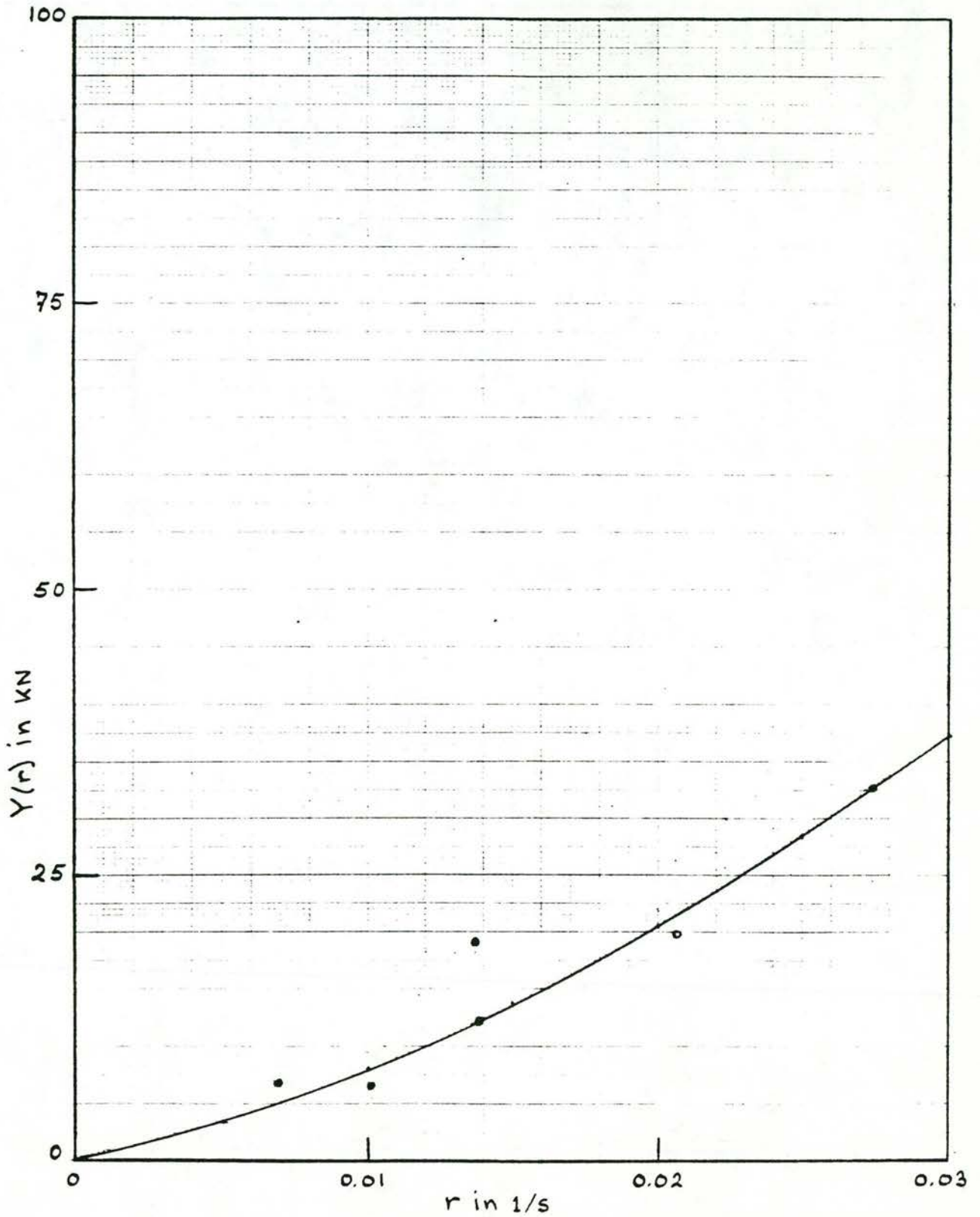
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

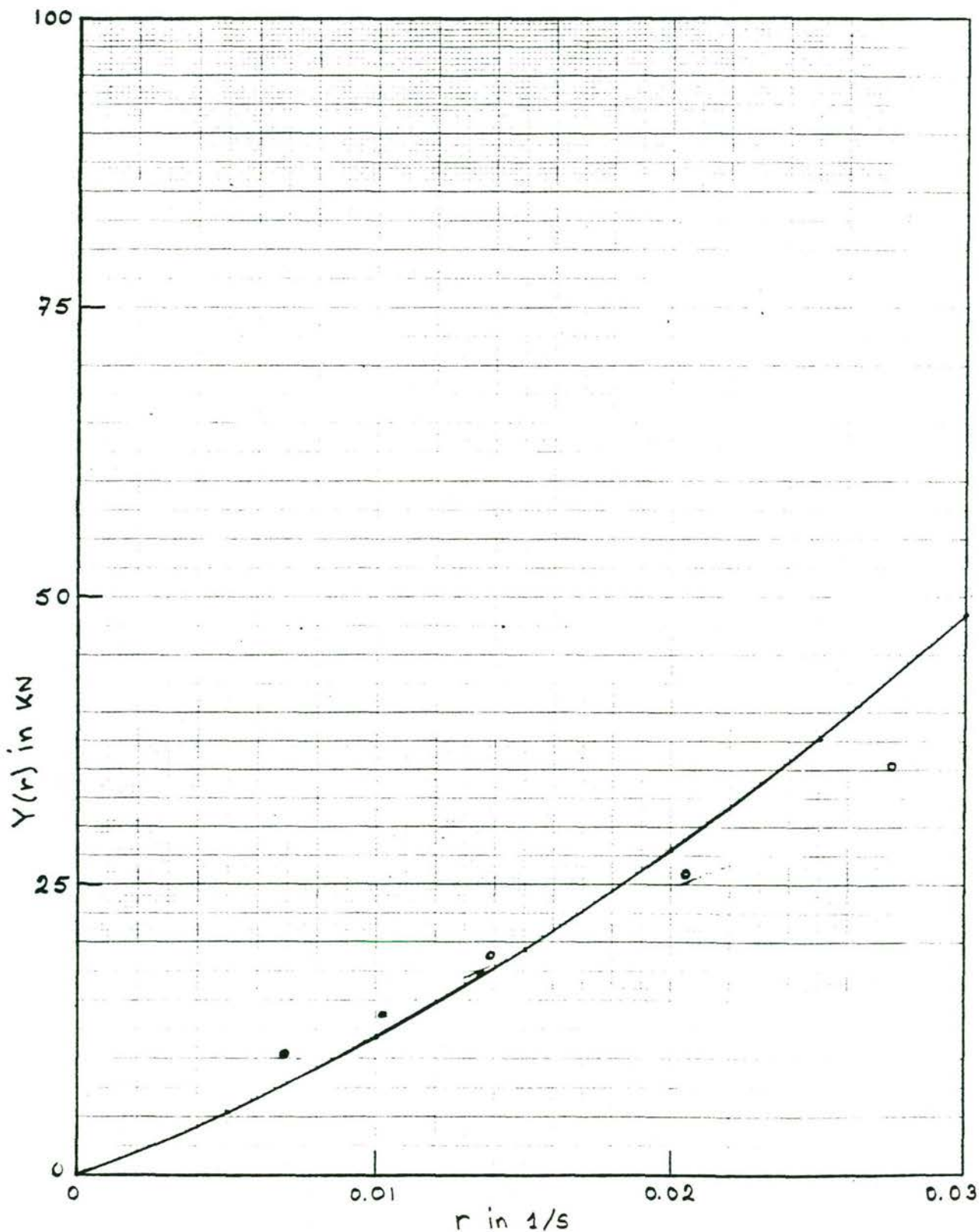
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

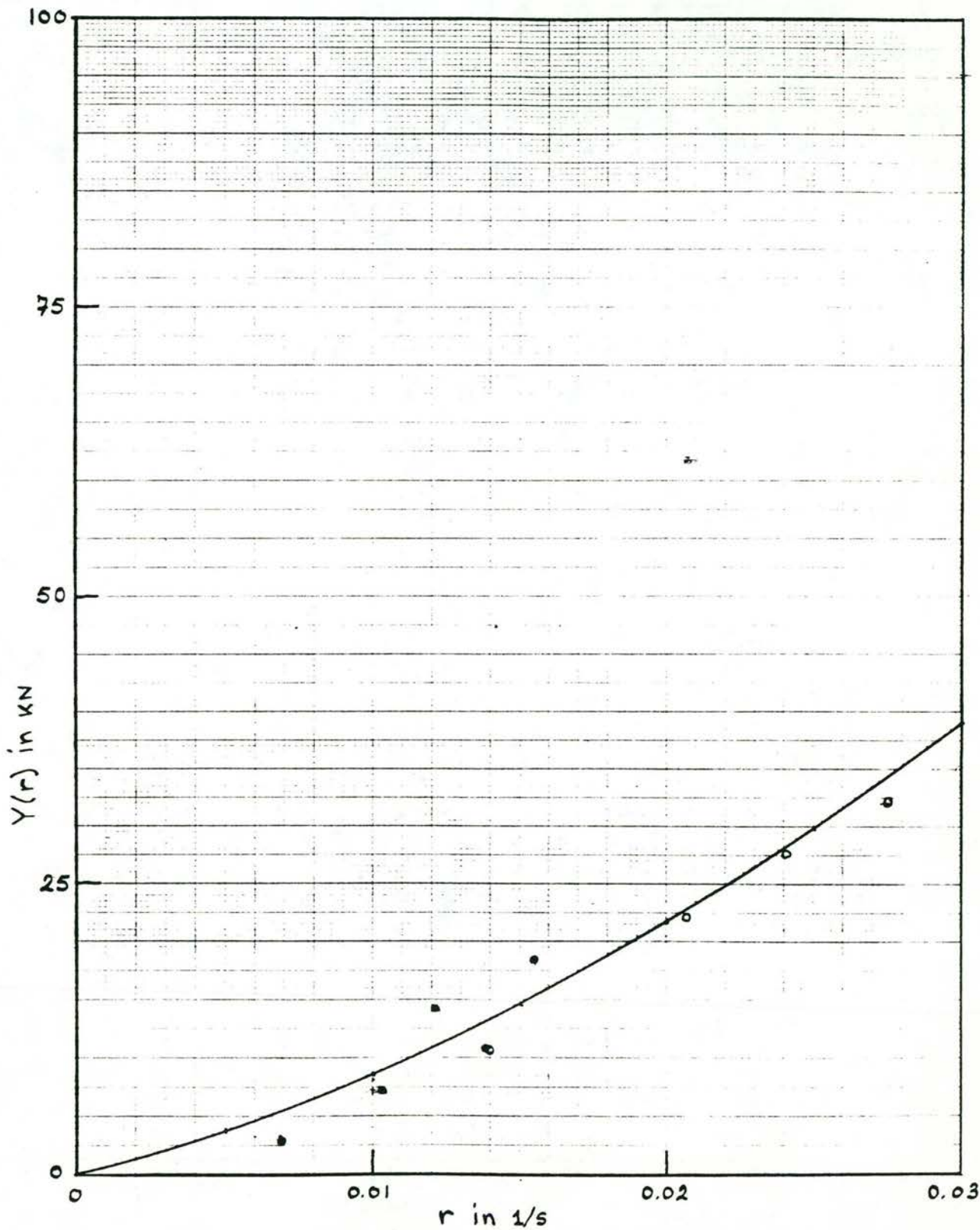
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

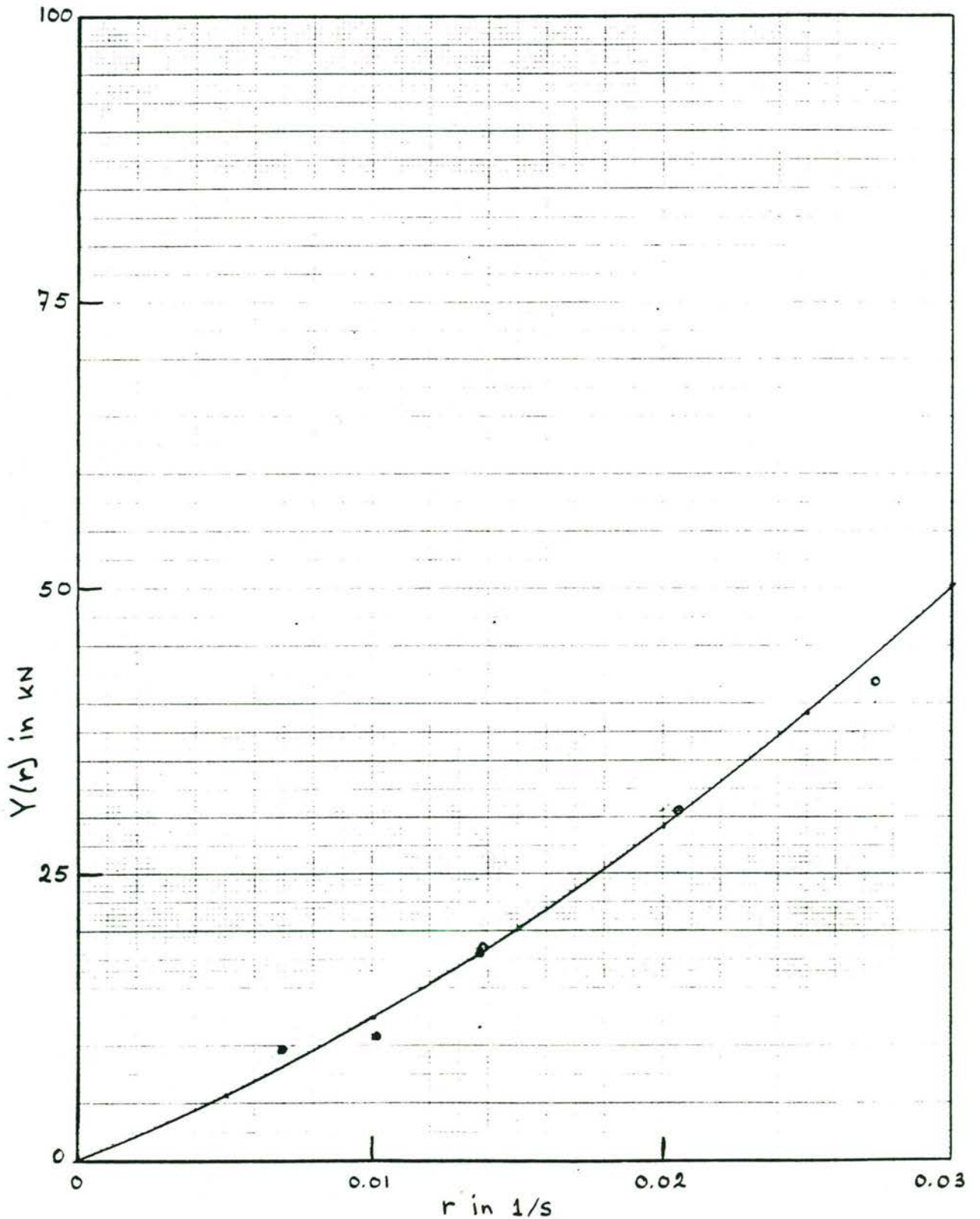
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○

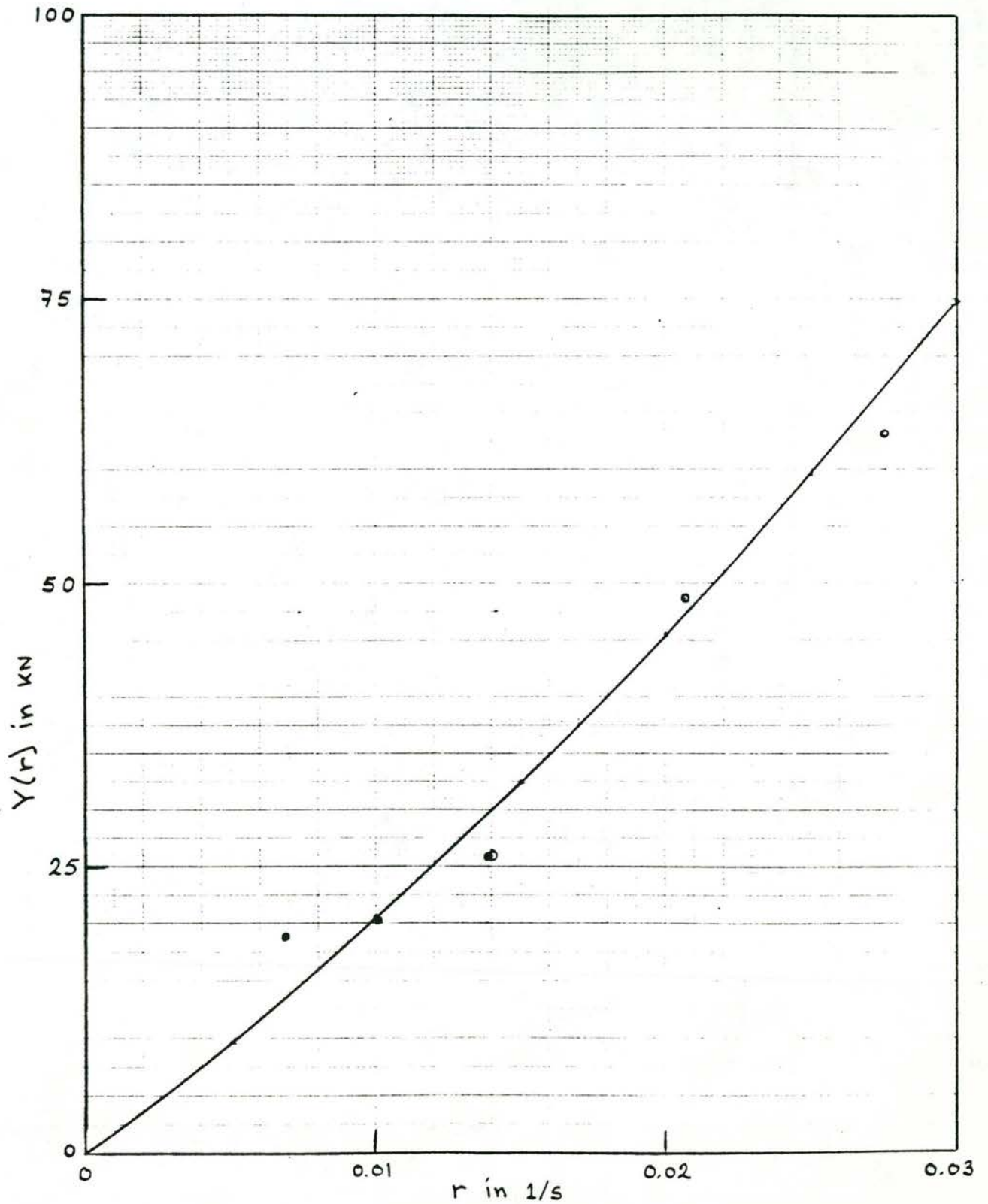


DVK Projekt Windhinder

rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

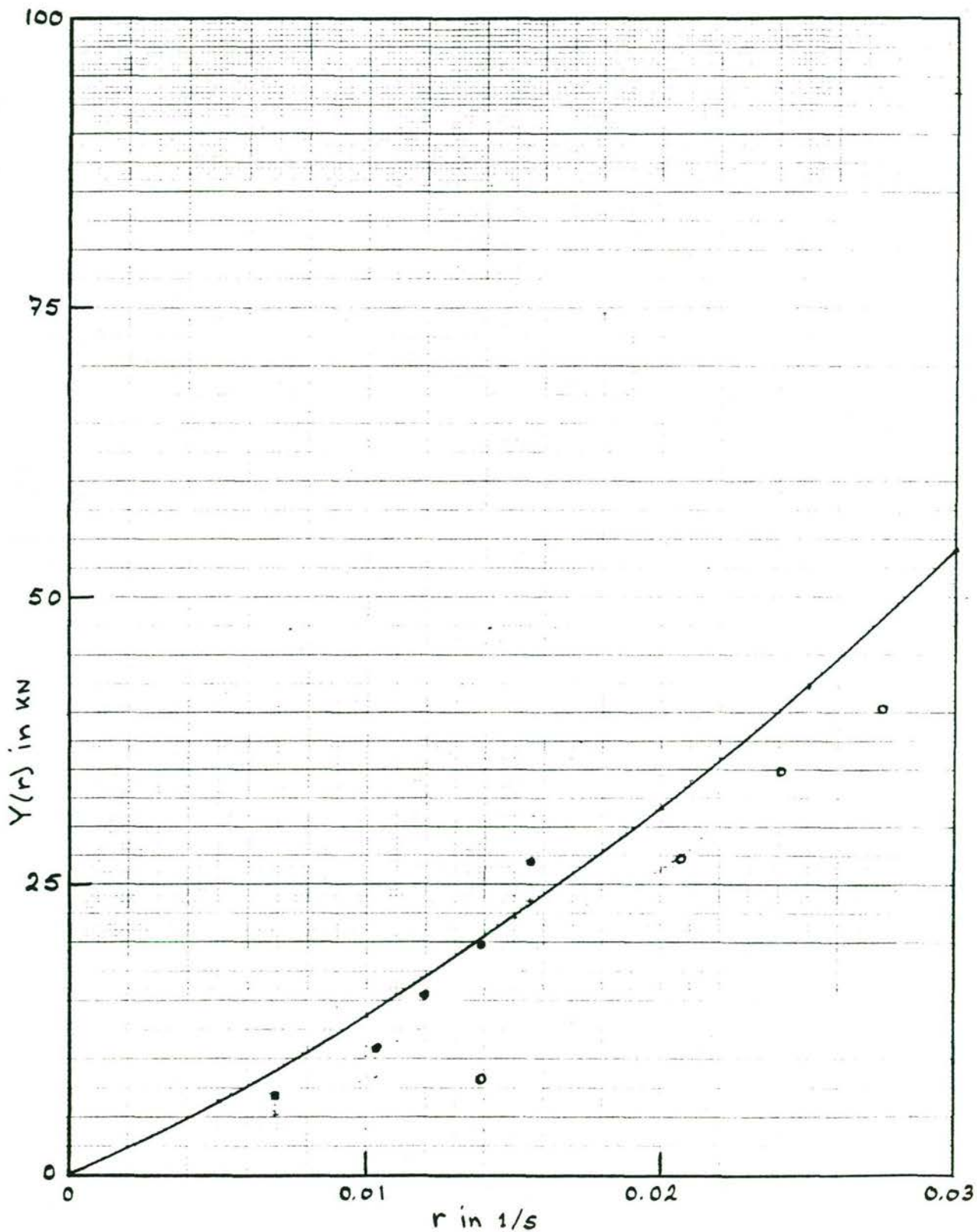
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

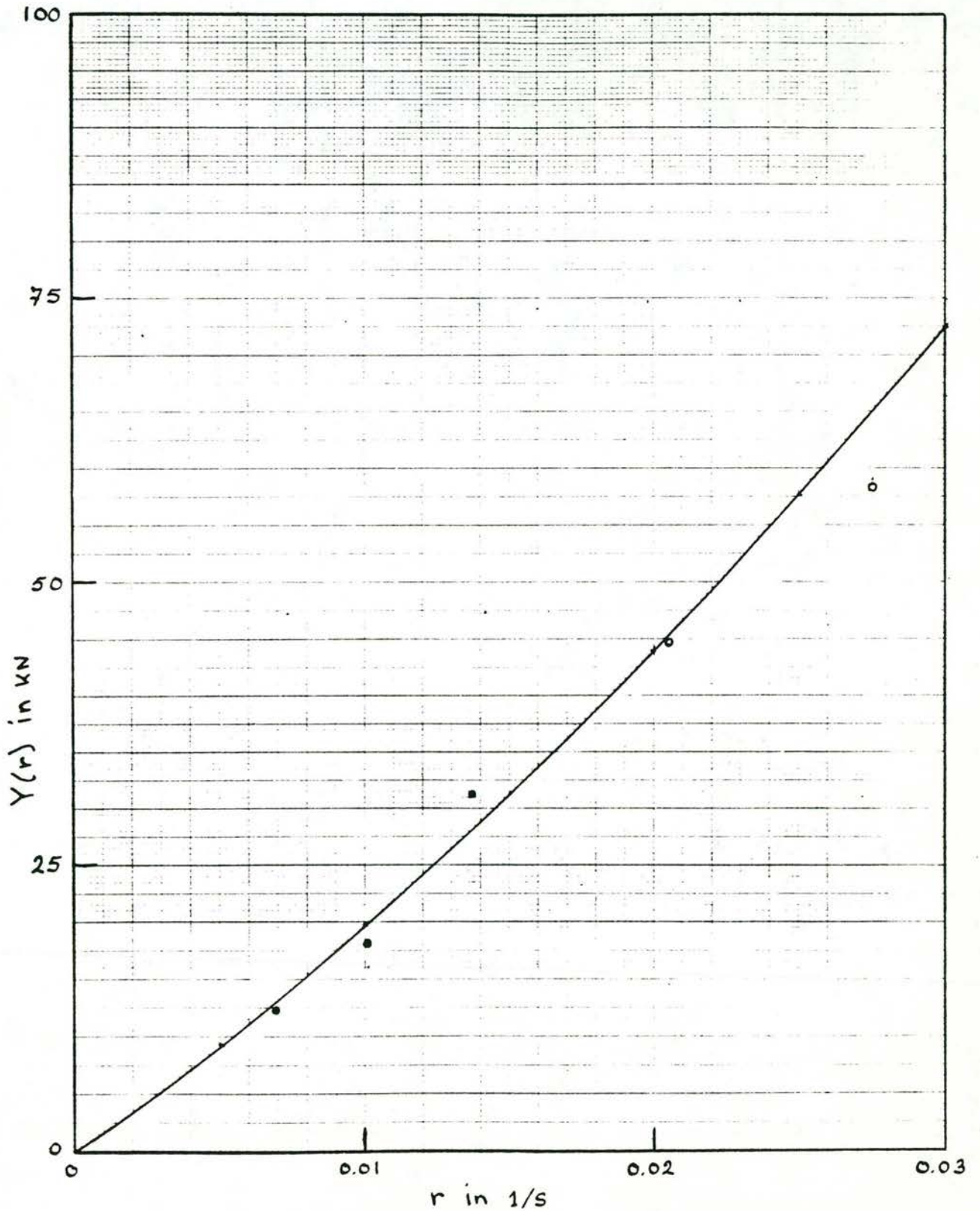
drifthoek : B= 0 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

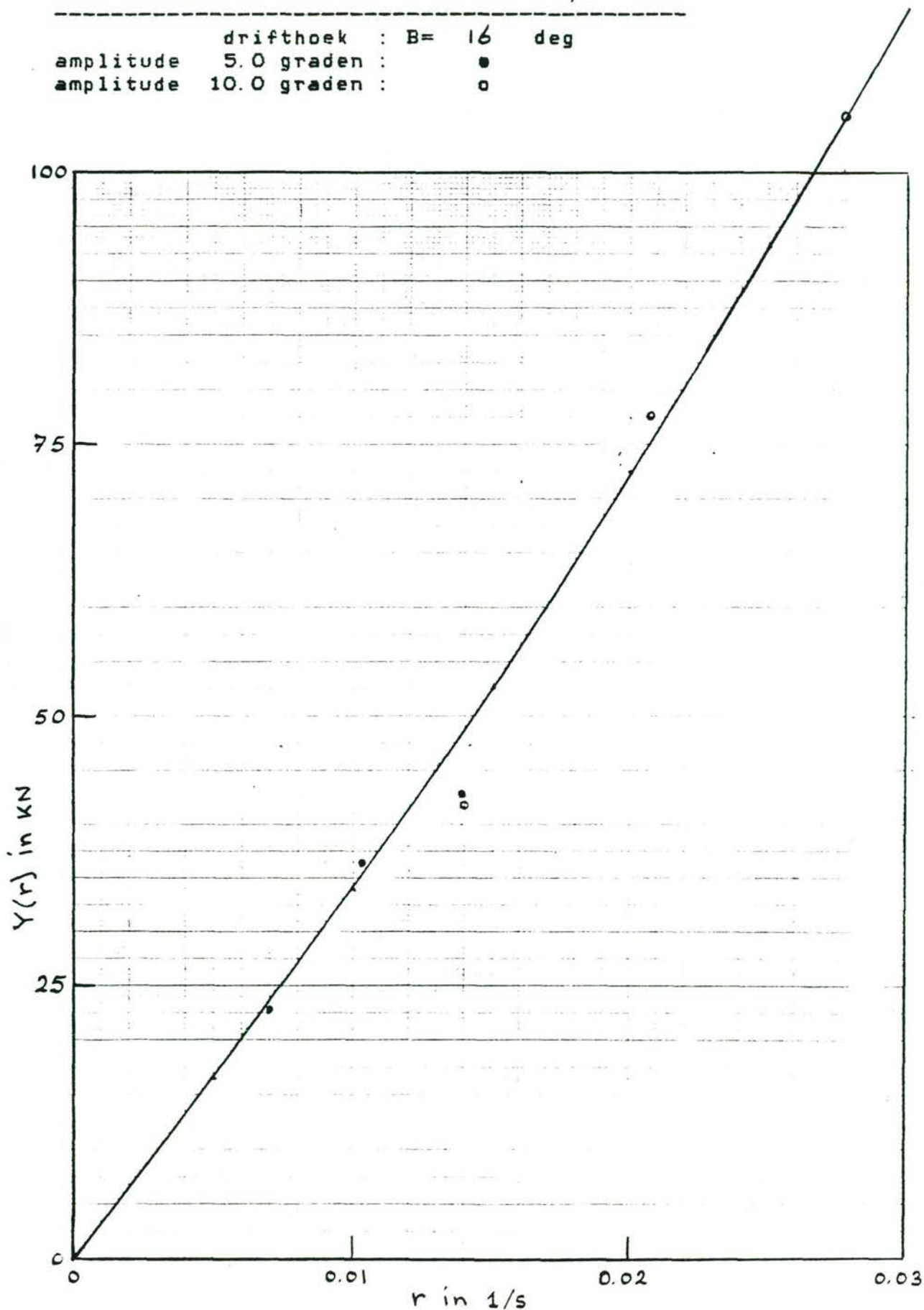
drifthoek : $B = \delta$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

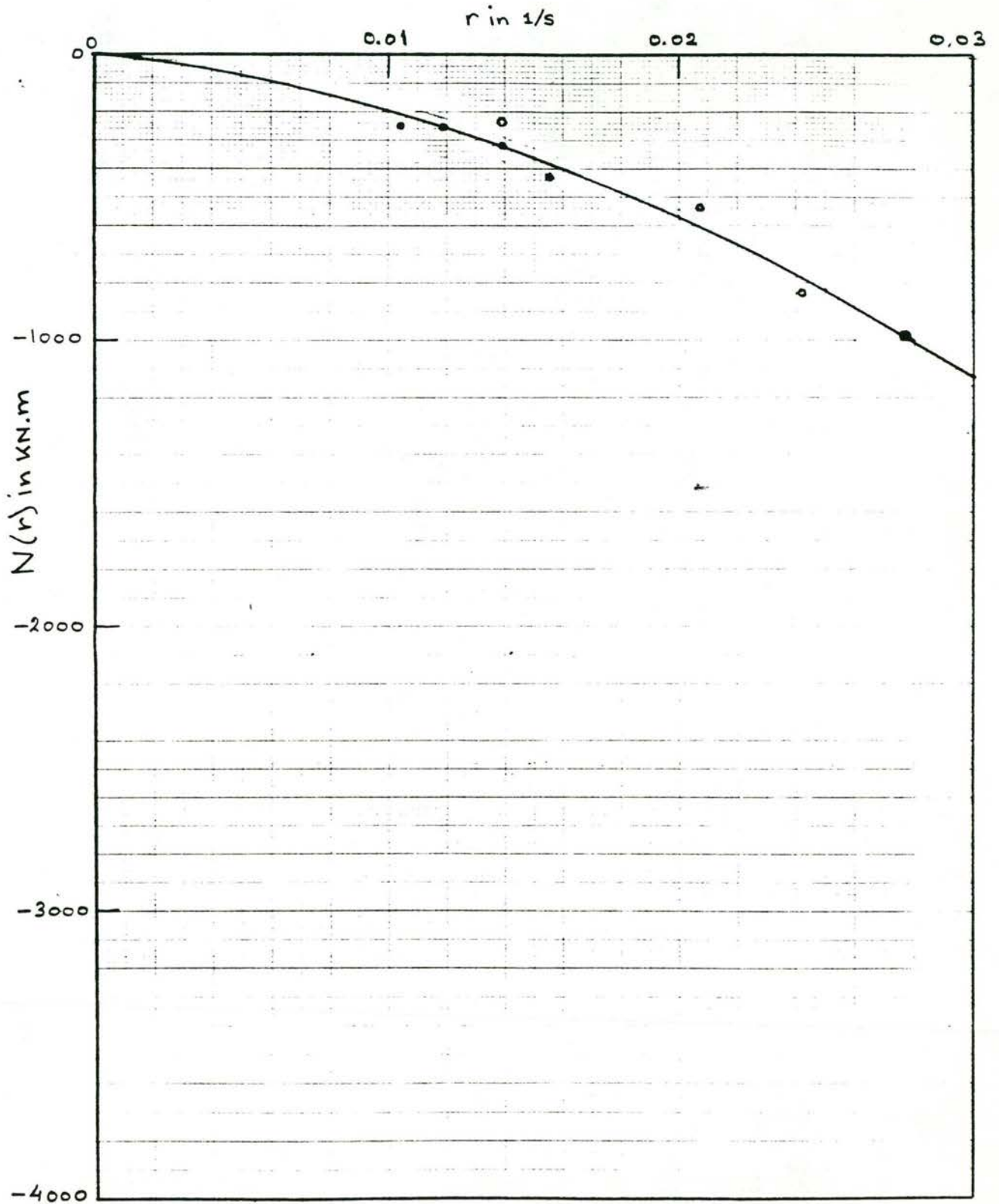
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

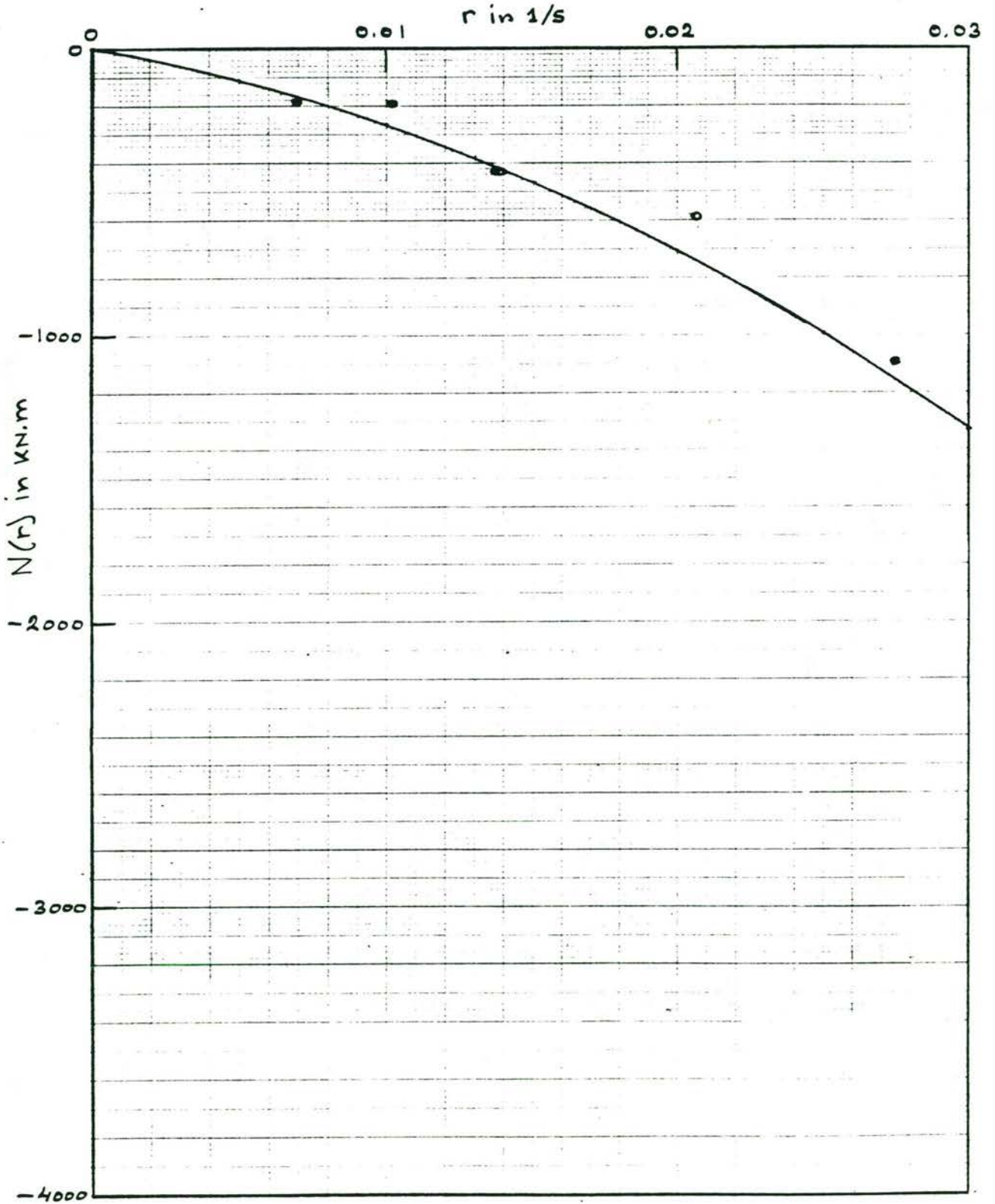
drifthoek : B= 0 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

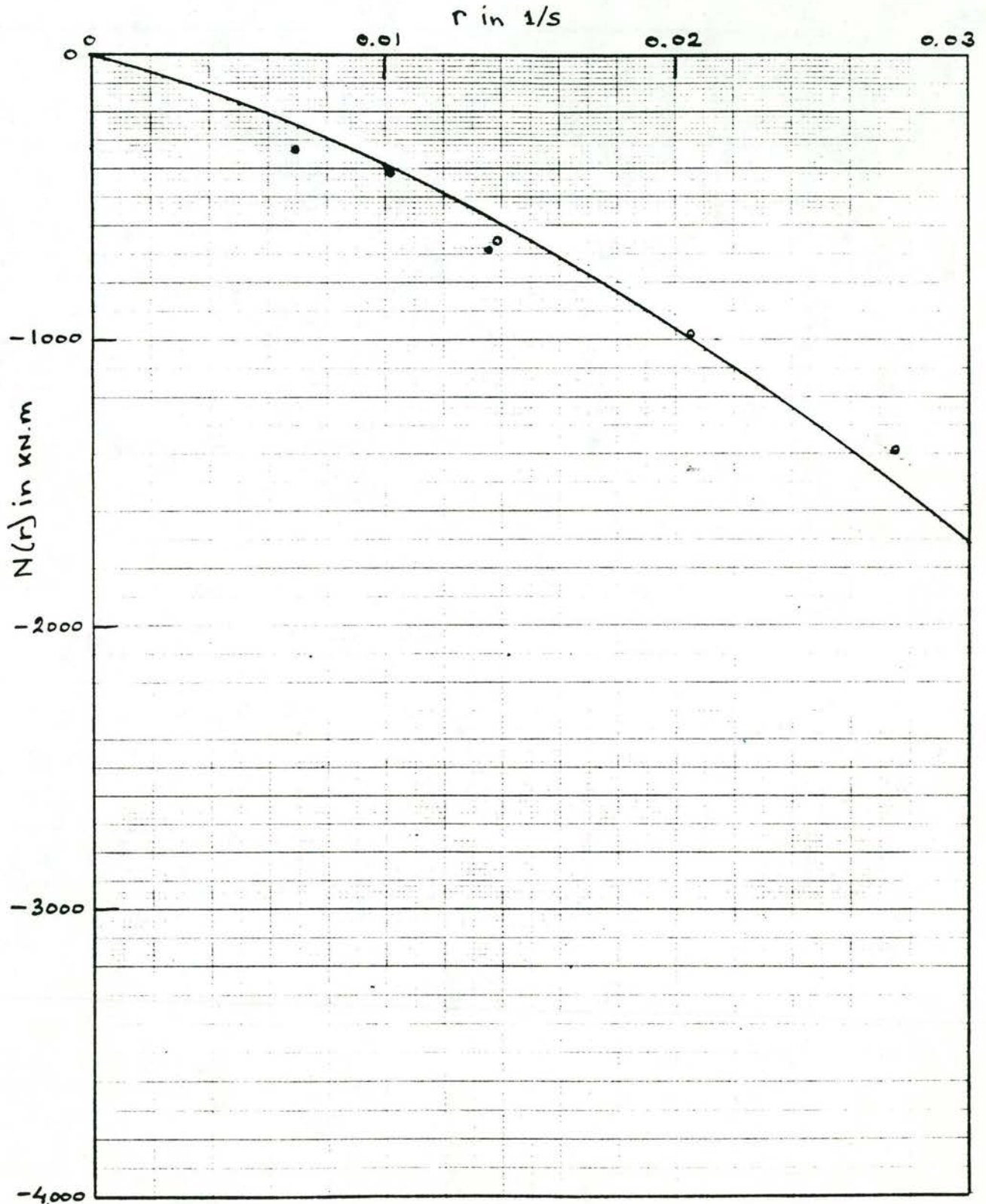
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

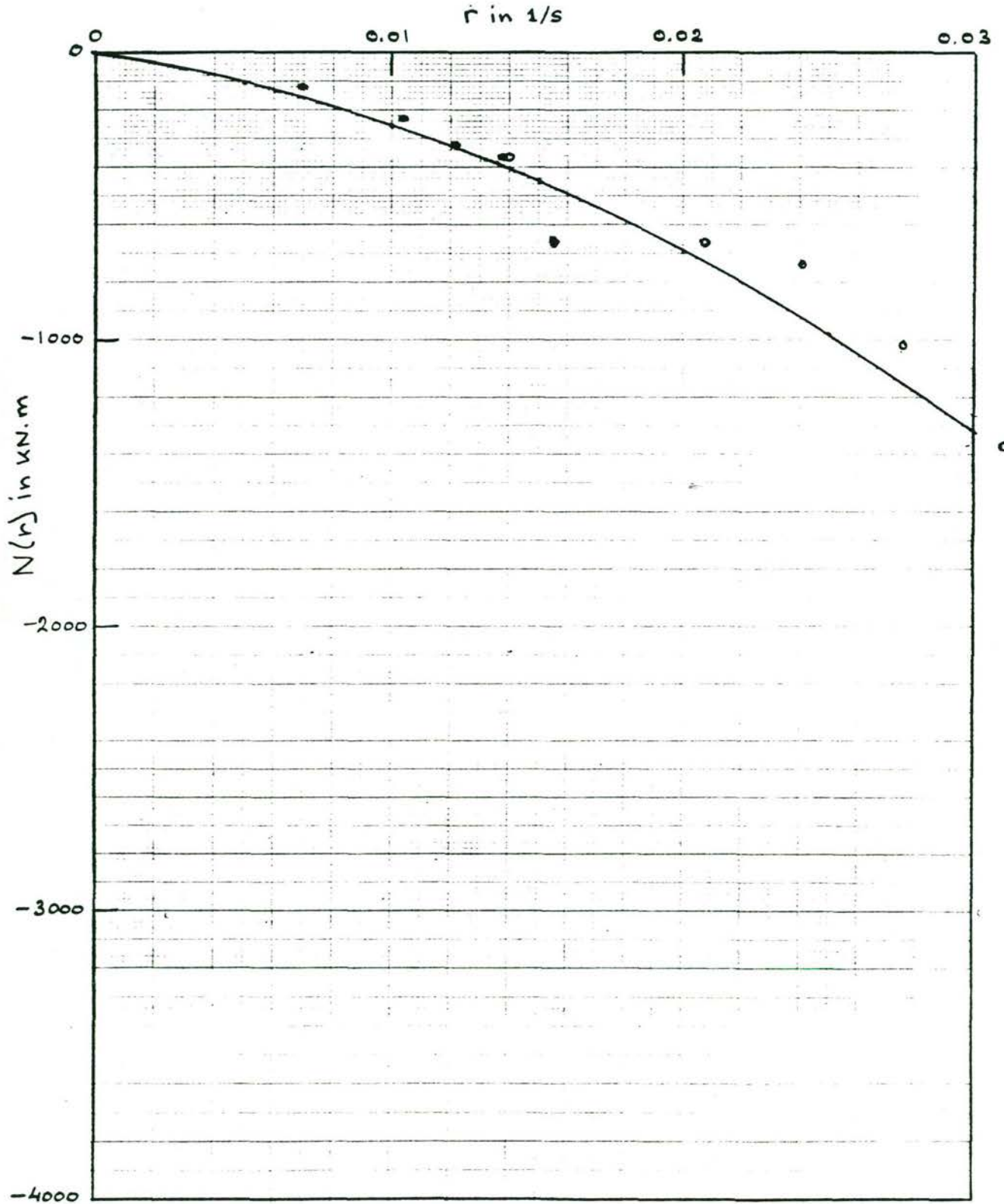
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

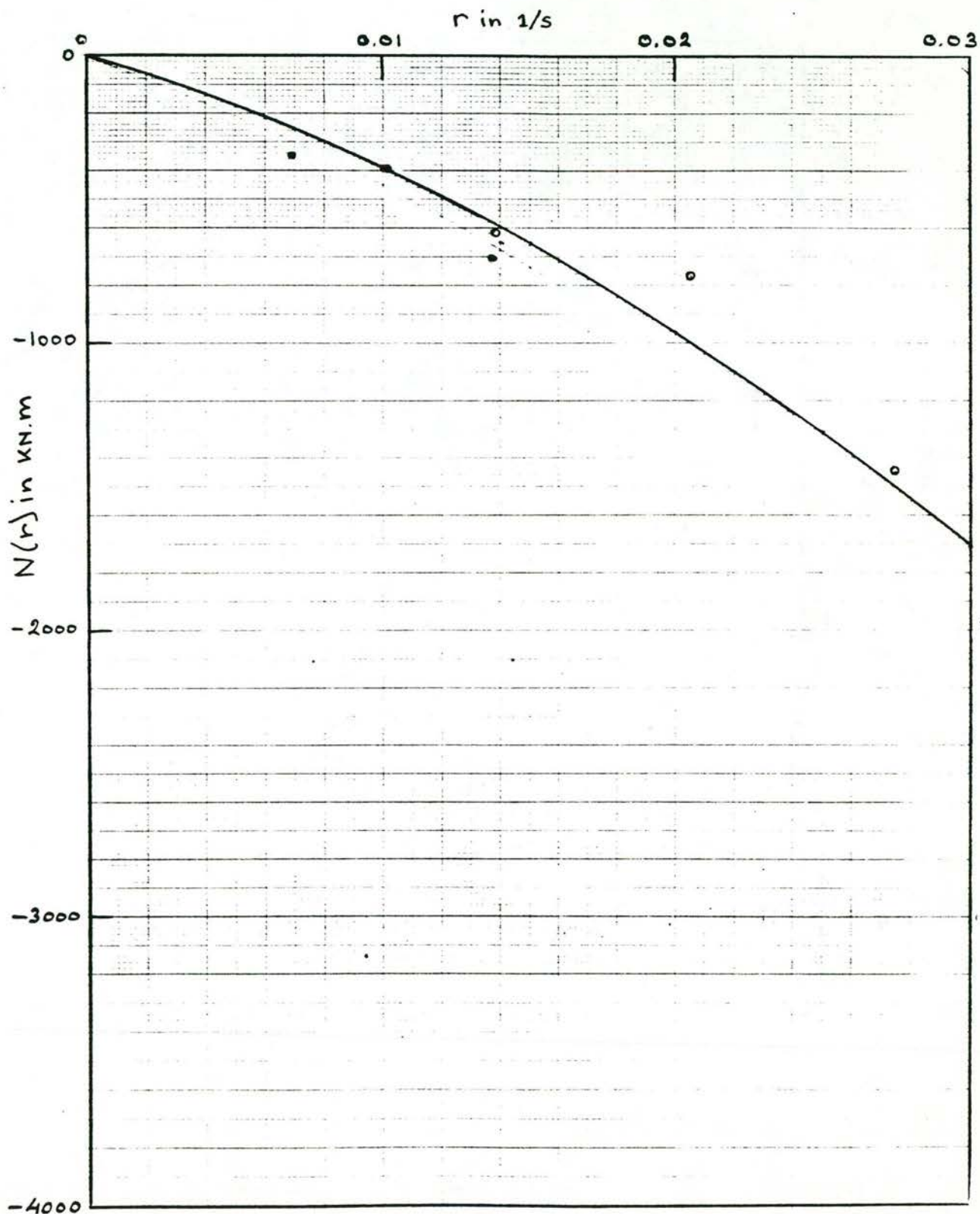
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

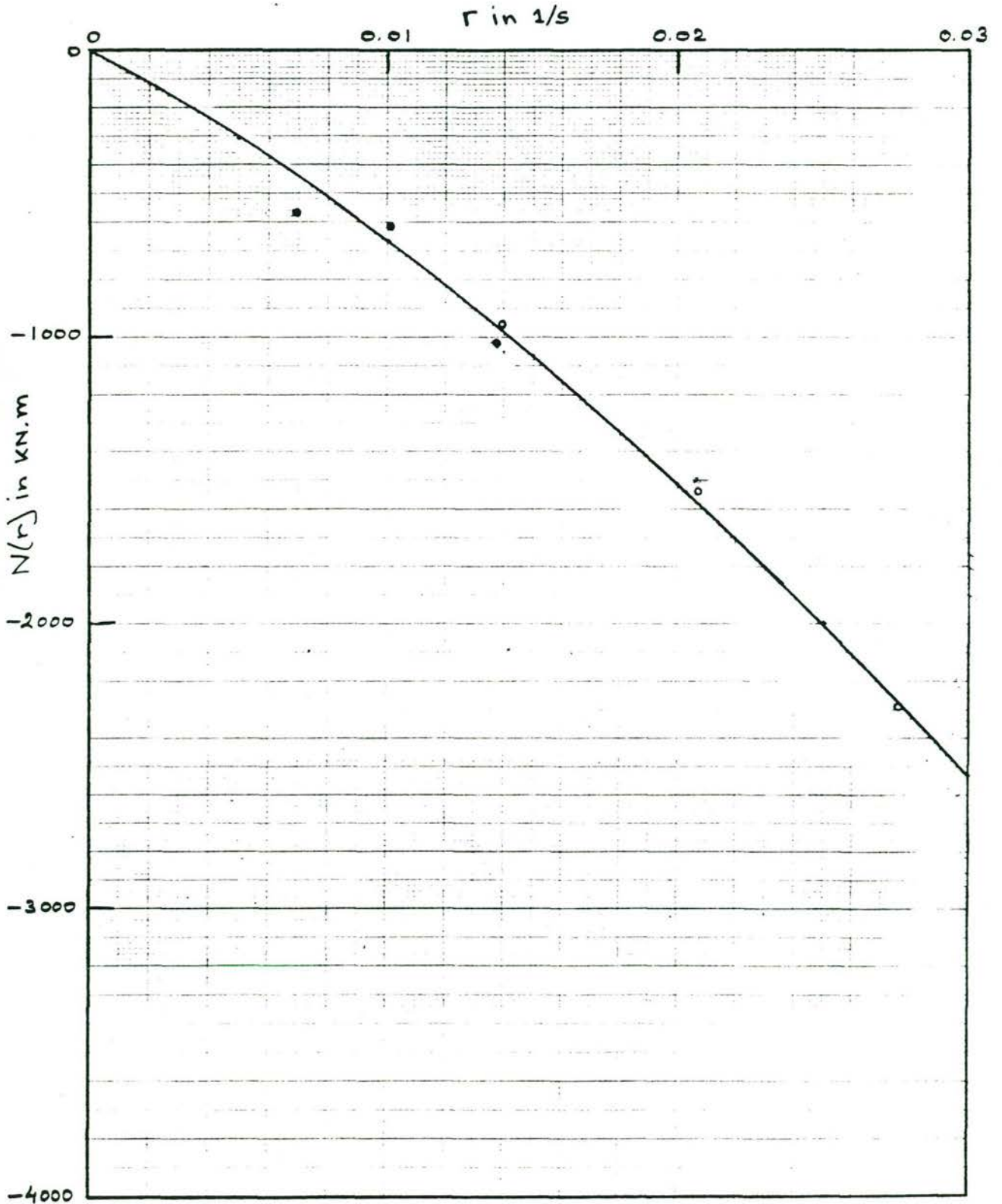
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

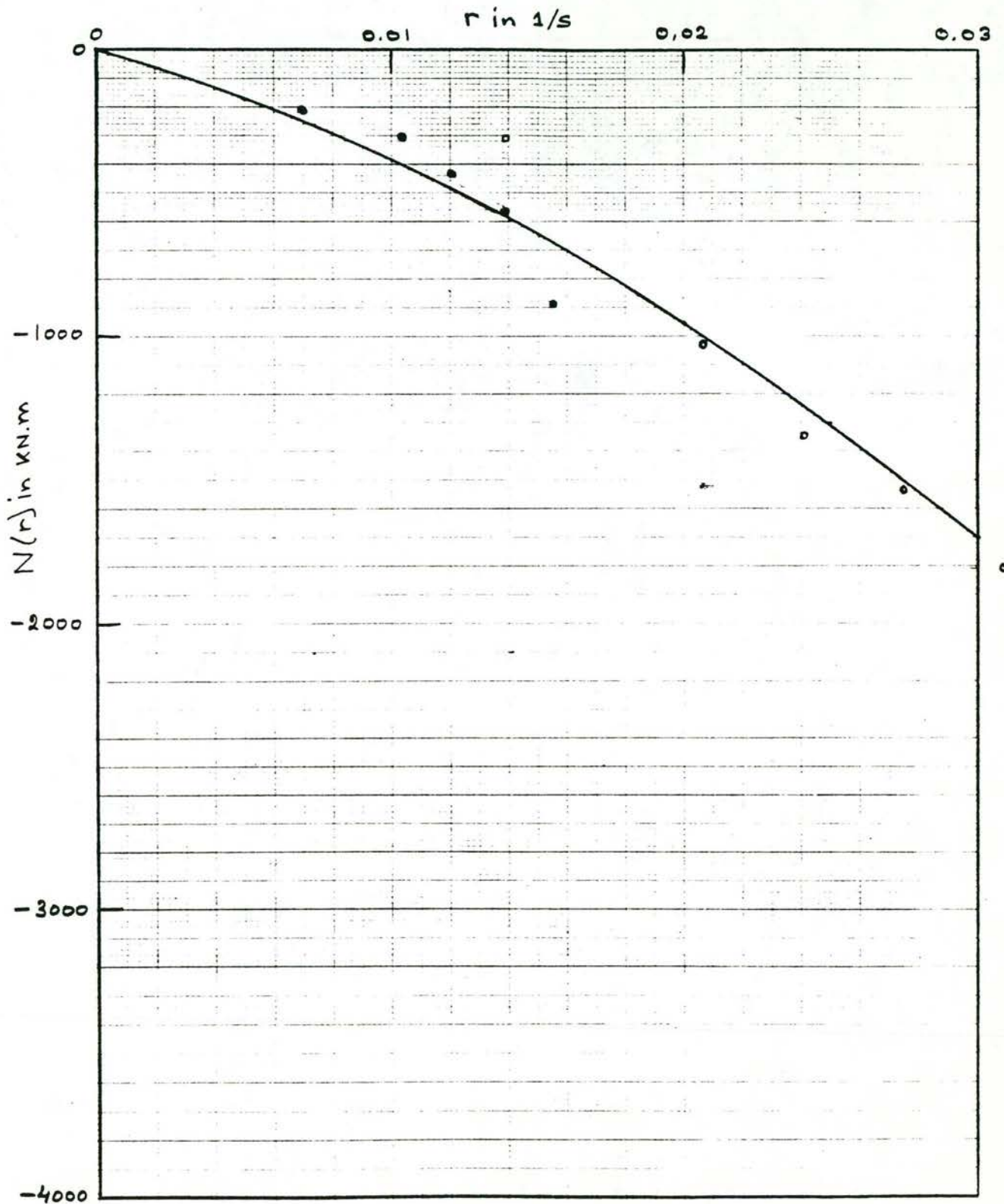
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

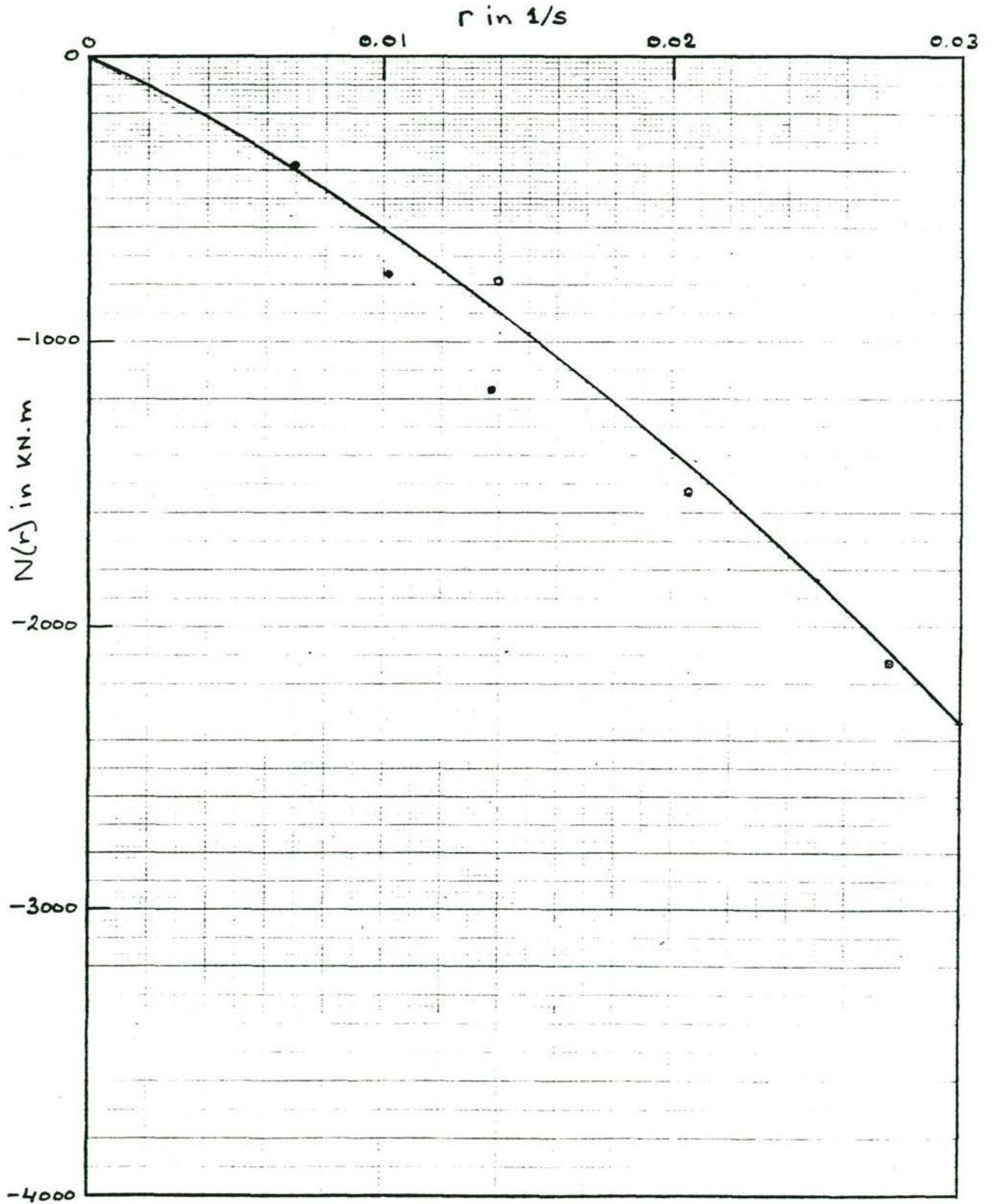
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

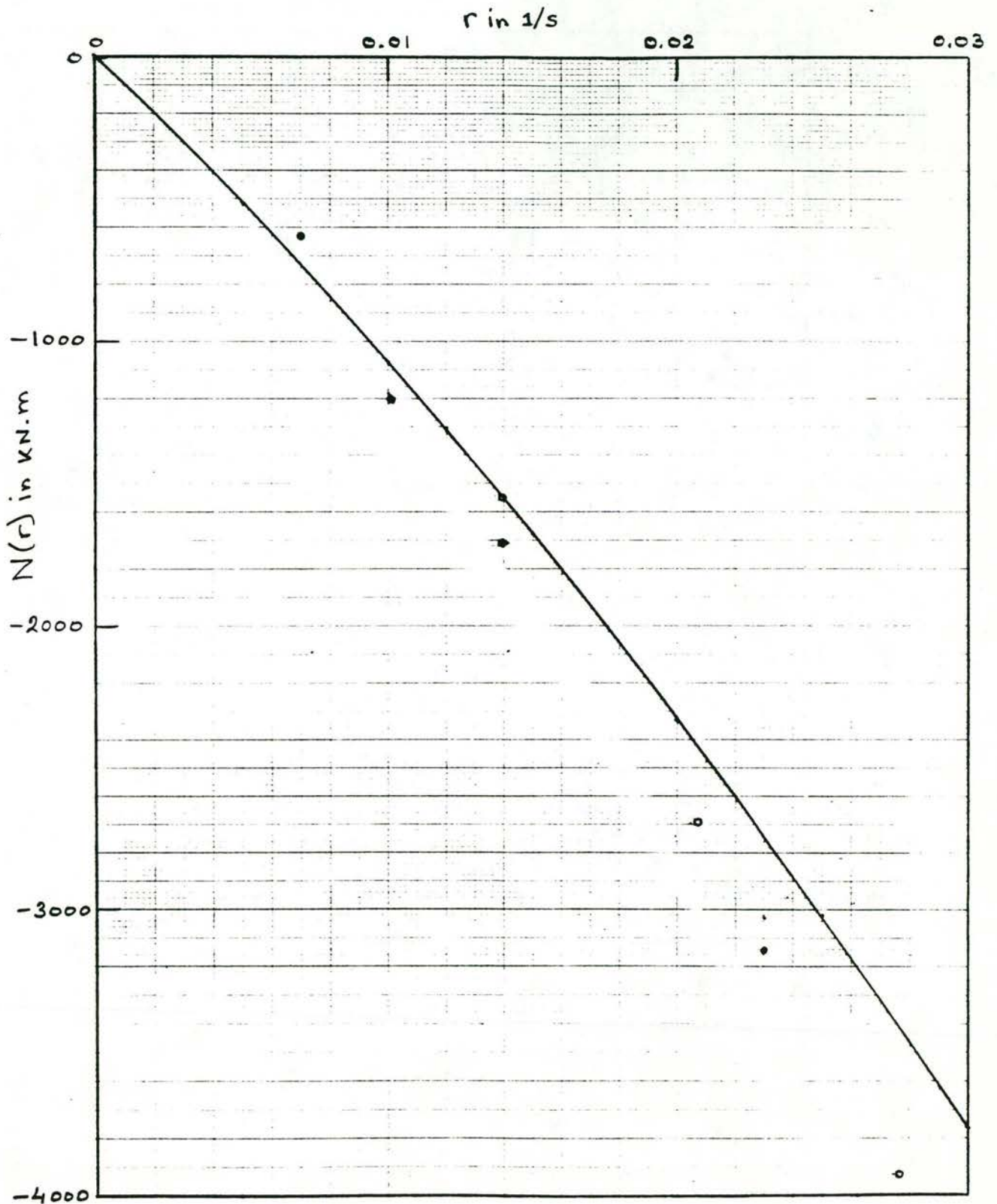
drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



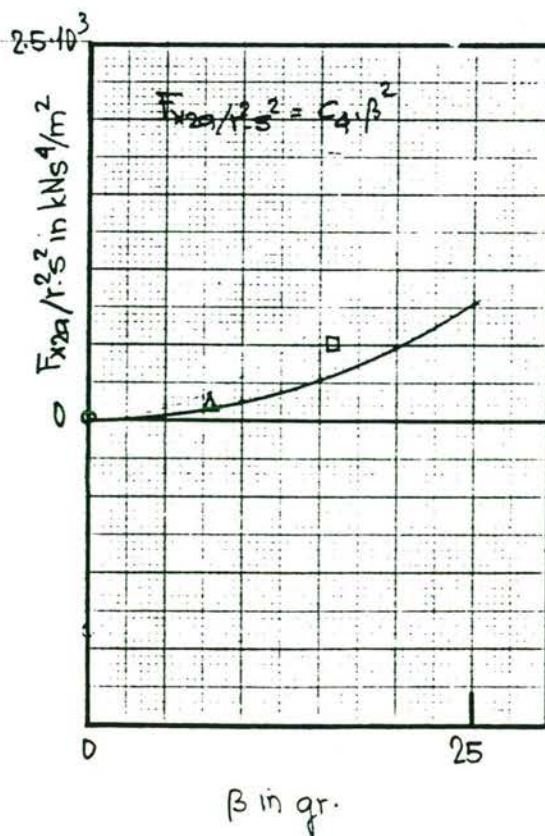
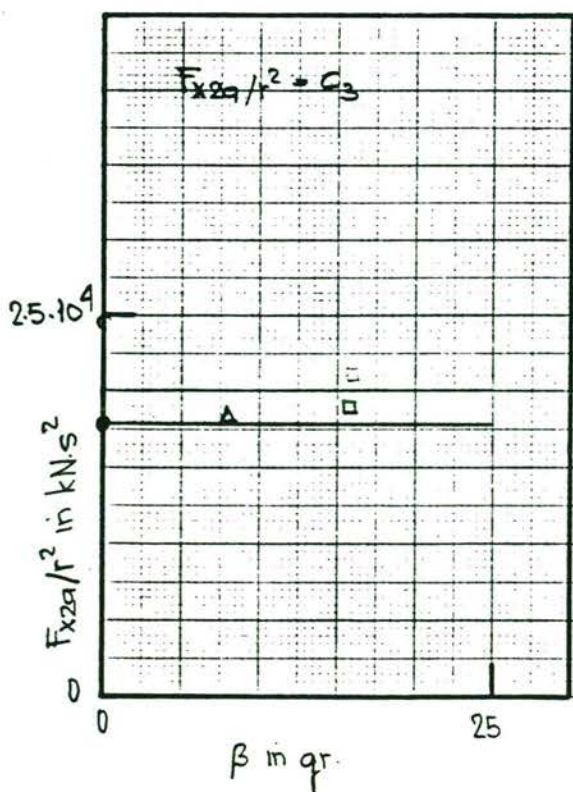
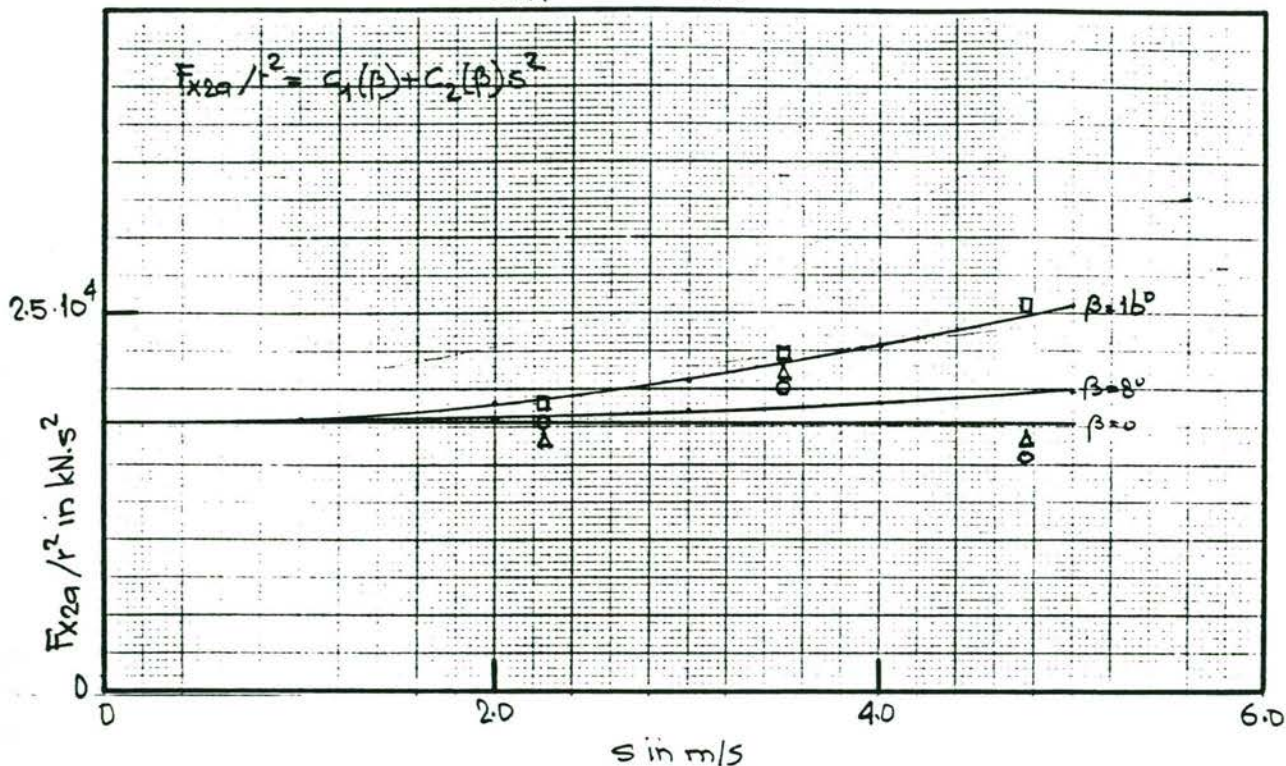
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_{x2a}(r) = X_{2arr} \cdot r^2 + X_{2arr} \beta \beta_{ss} \cdot r \cdot \beta \cdot s^2$$

$$\hat{=} X_{2arr} \cdot r^2 + X_{2arr} v v \cdot r^2 v^2$$



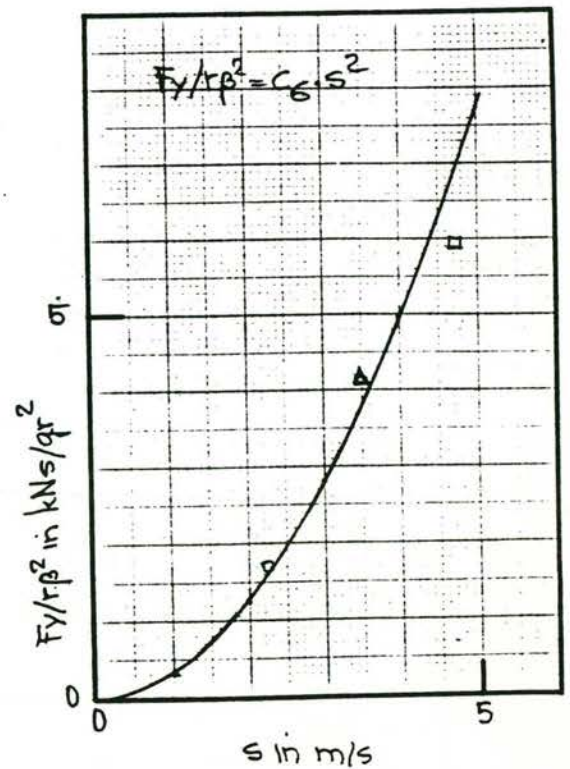
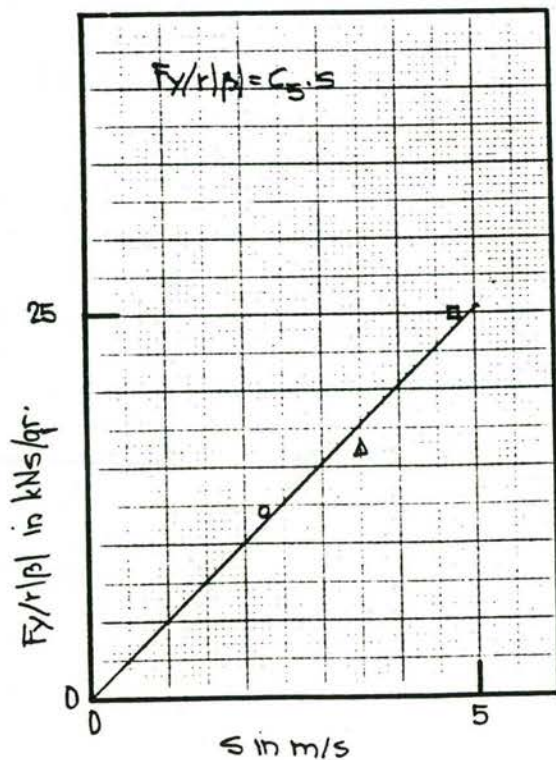
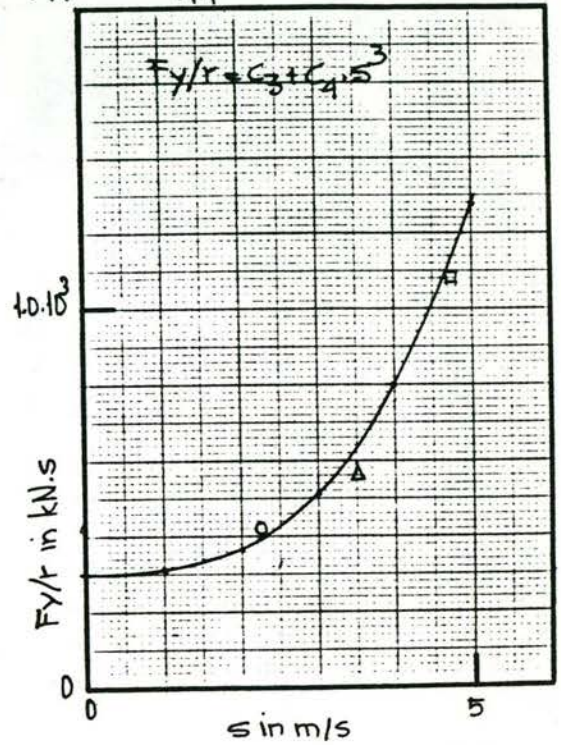
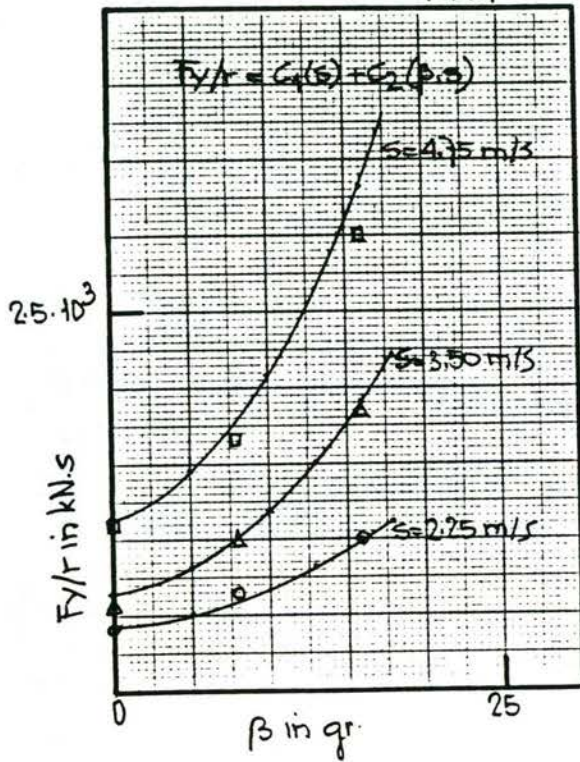
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIE PROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_y(r) = Y_r \cdot r + Y_{r\dot{s}s} \cdot r\dot{s}^3 + Y_{r|\beta|s} \cdot r|\beta|s + Y_{r\dot{\beta}s} \cdot r\dot{\beta}s^2 + Y_{r|r|} \cdot r|r|$$

$$\triangleq Y_r \cdot r + Y_{ruu} \cdot r \cdot u^3 + Y_{r|v|} \cdot r|v| + Y_{rvv} \cdot r v^2 + Y_{r|r|} \cdot r|r|$$



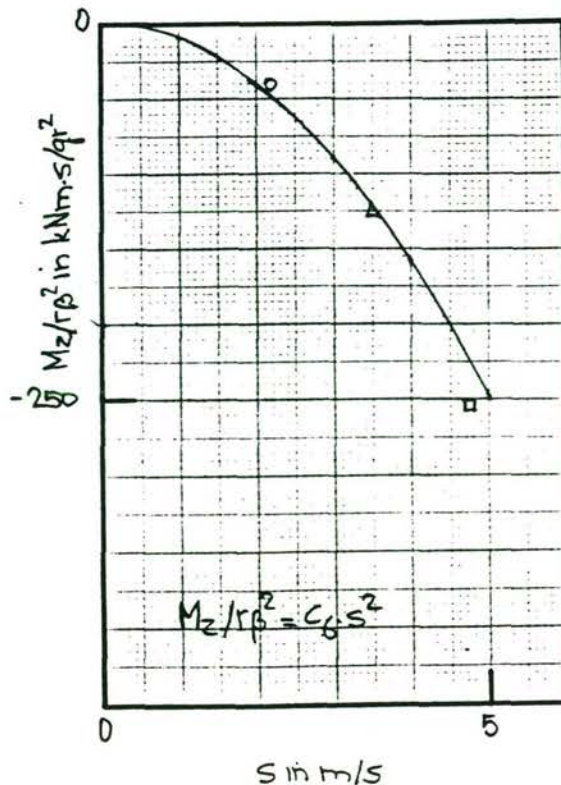
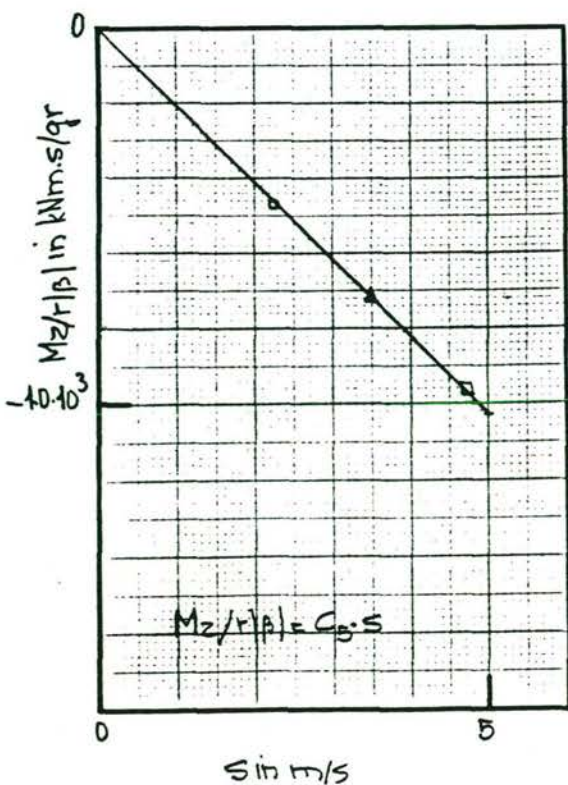
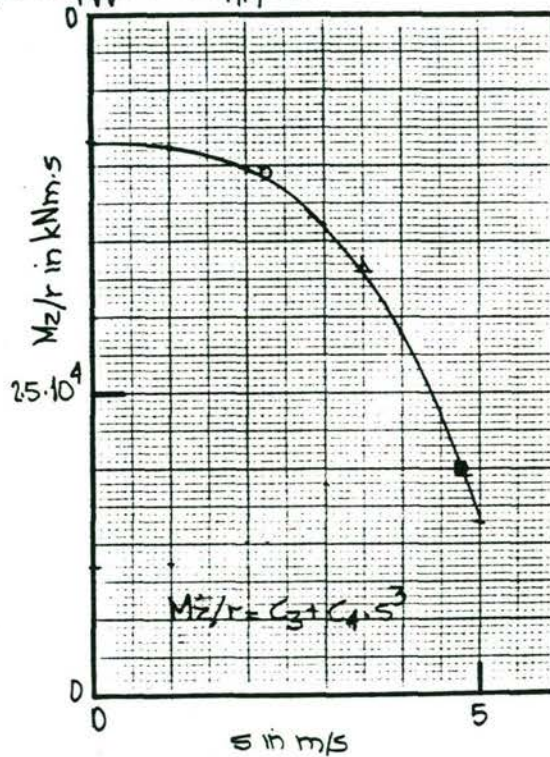
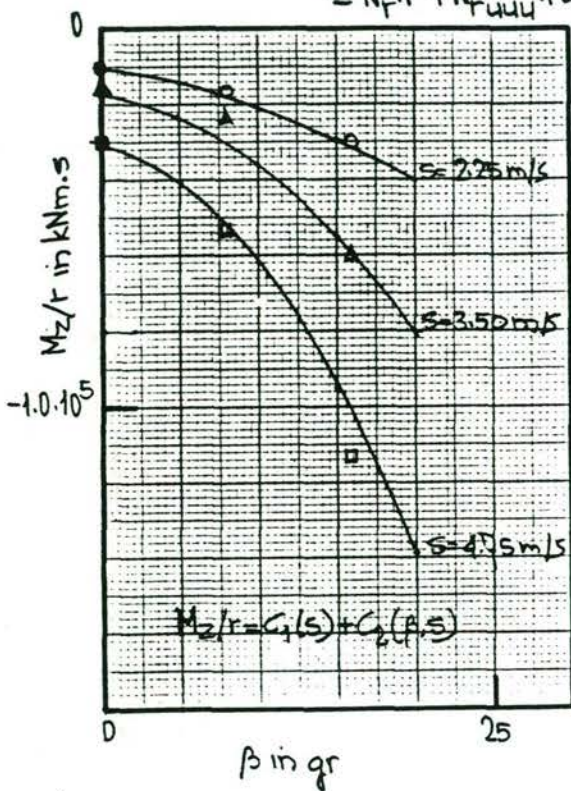
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

nijn-herne kanaal schipballast, breed water

$$M_z(r) = N_r \cdot r + N_{r_{sss}} \cdot r s^3 + N_{r|\beta|s} \cdot r |\beta| s + N_{r\beta s s} \cdot r \beta^2 s^2 + N_{r|r|} \cdot r |r|$$

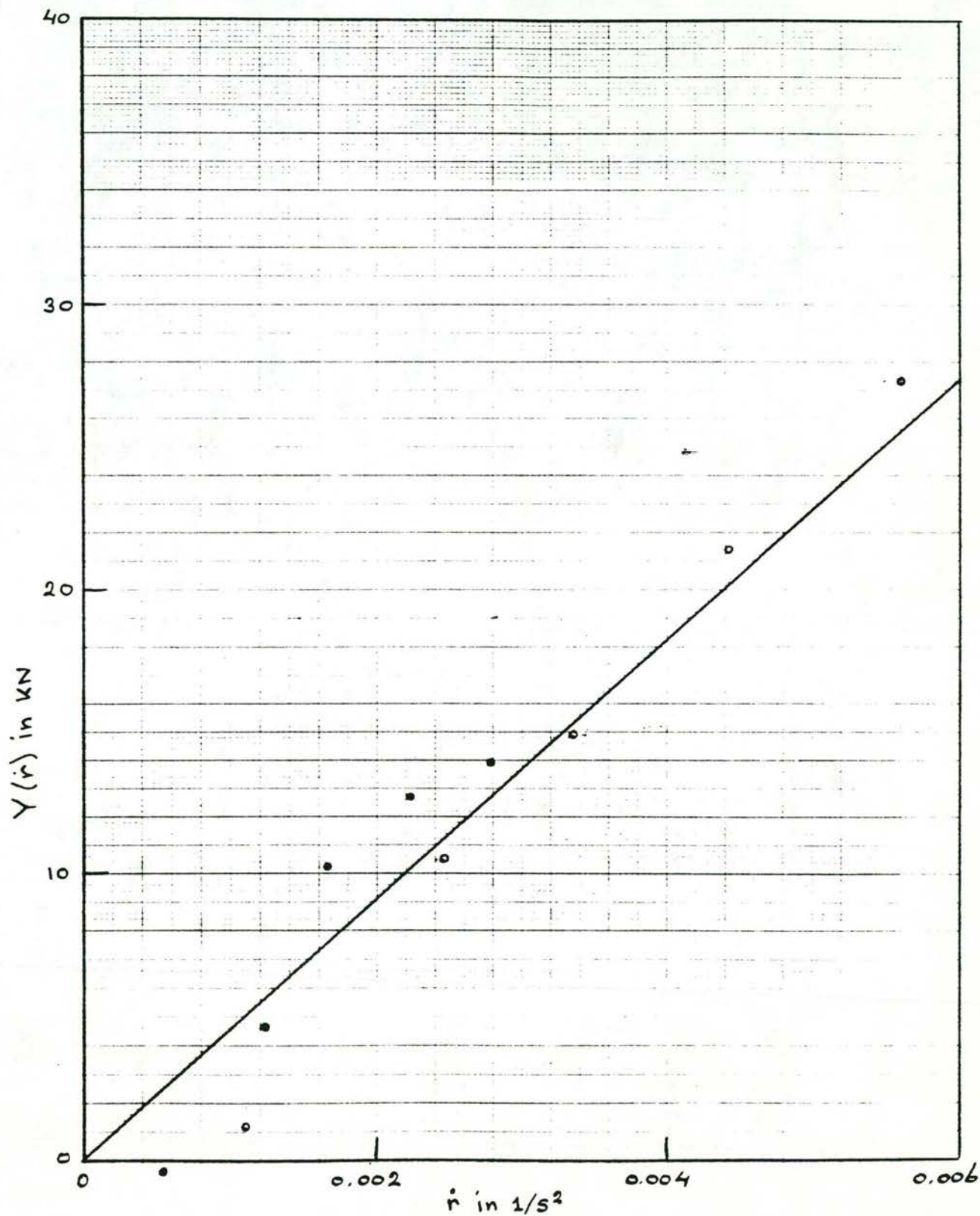
$$\cong N_r \cdot r + N_{r_{uuu}} \cdot r u^3 + N_{r|v|} \cdot r |v| + N_{r_{vv}} \cdot r v^2 + N_{r|r|} \cdot r |r|$$



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

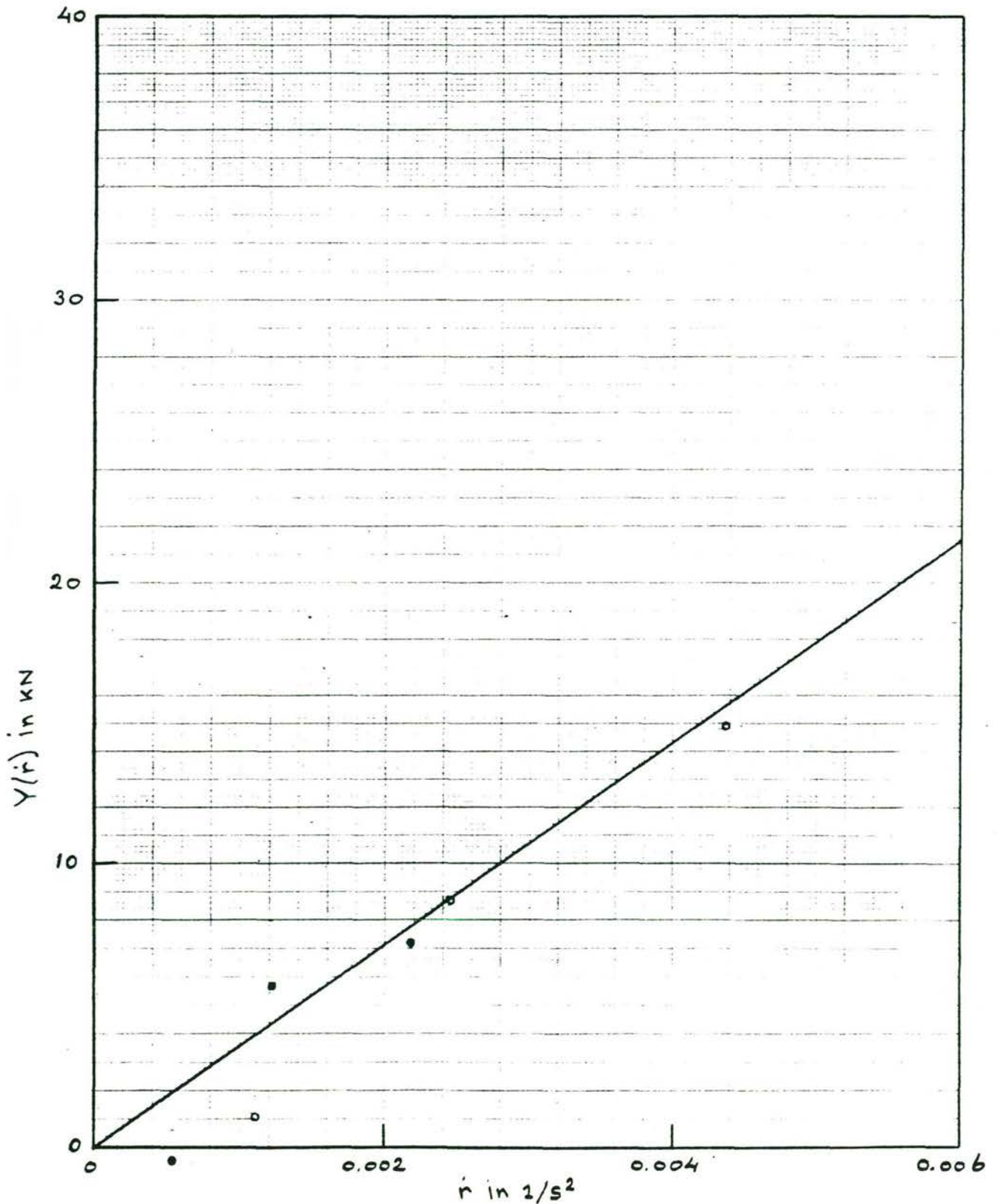
 drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

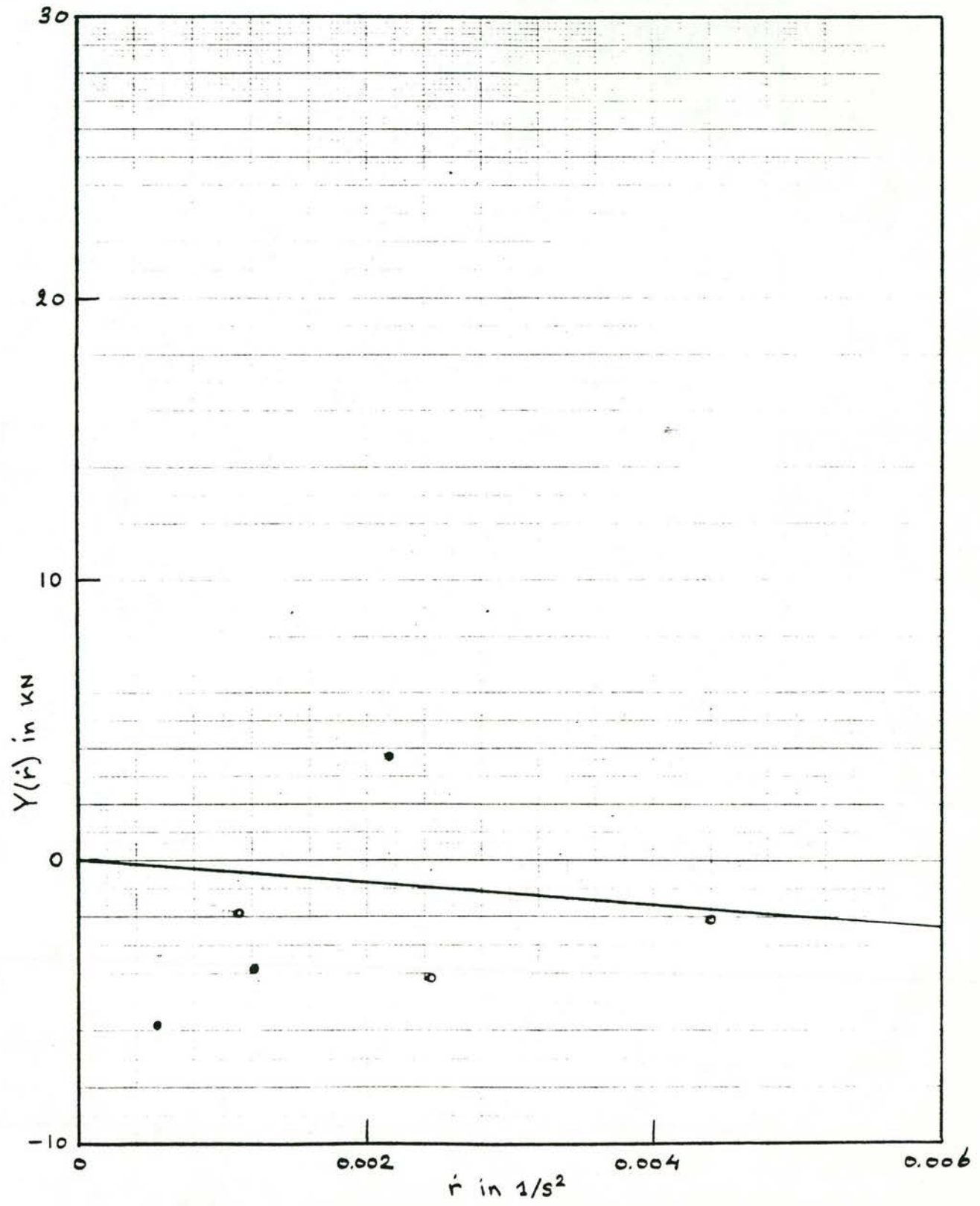
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

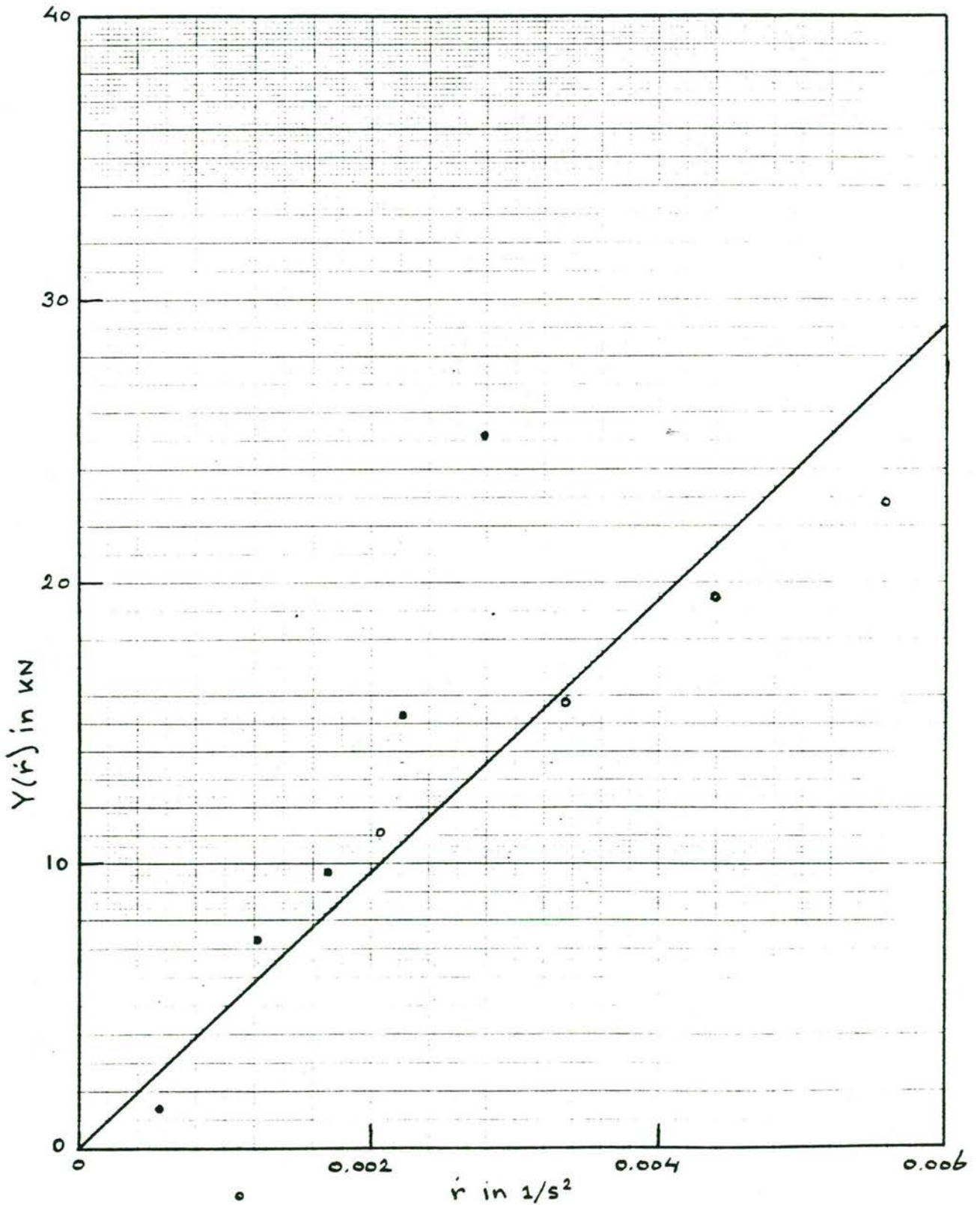
drifthoek : B= 16 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

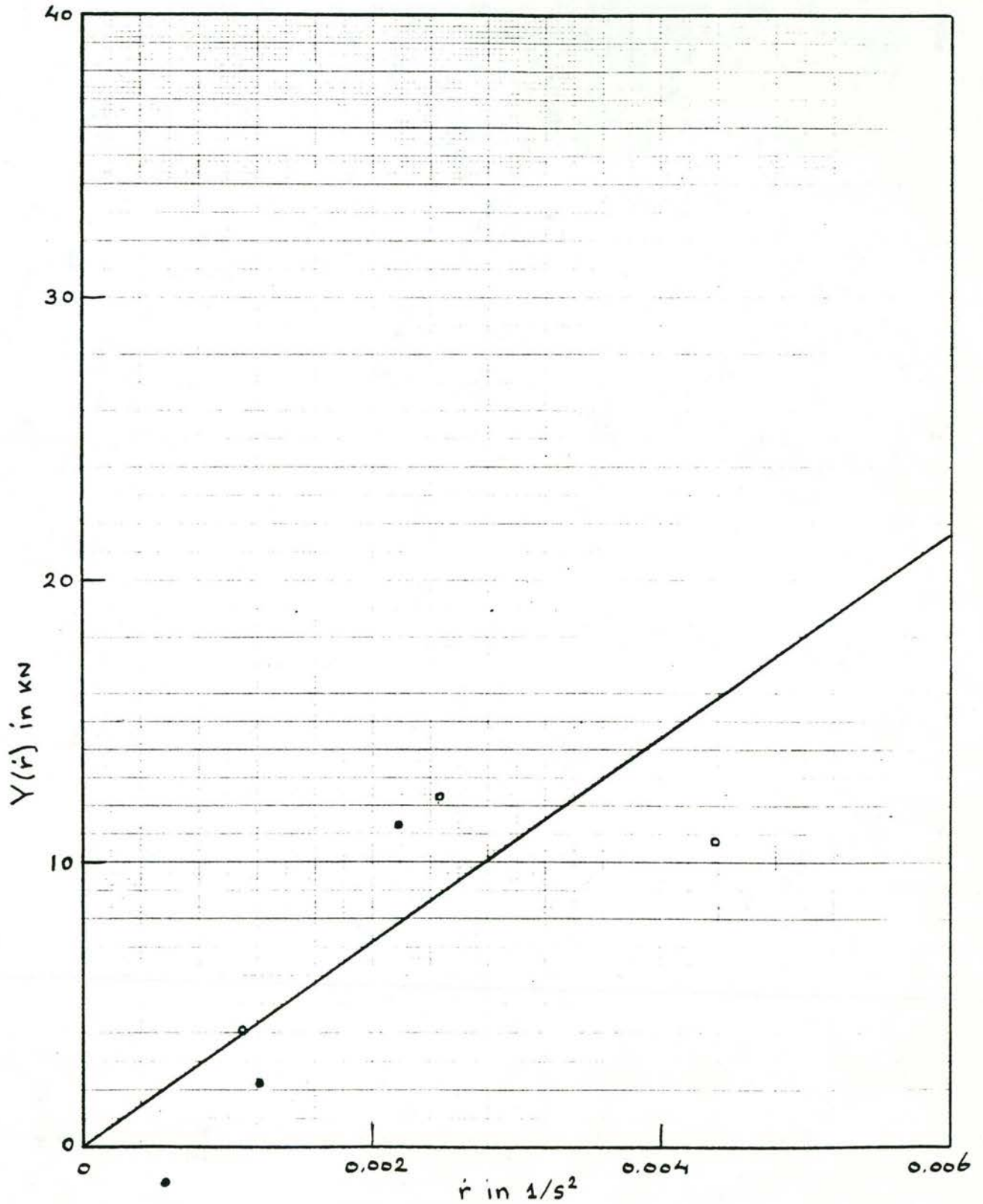
drifthoek : $B = \circ$ deg
 amplitude 5.0 graden : \bullet
 amplitude 10.0 graden : \circ



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

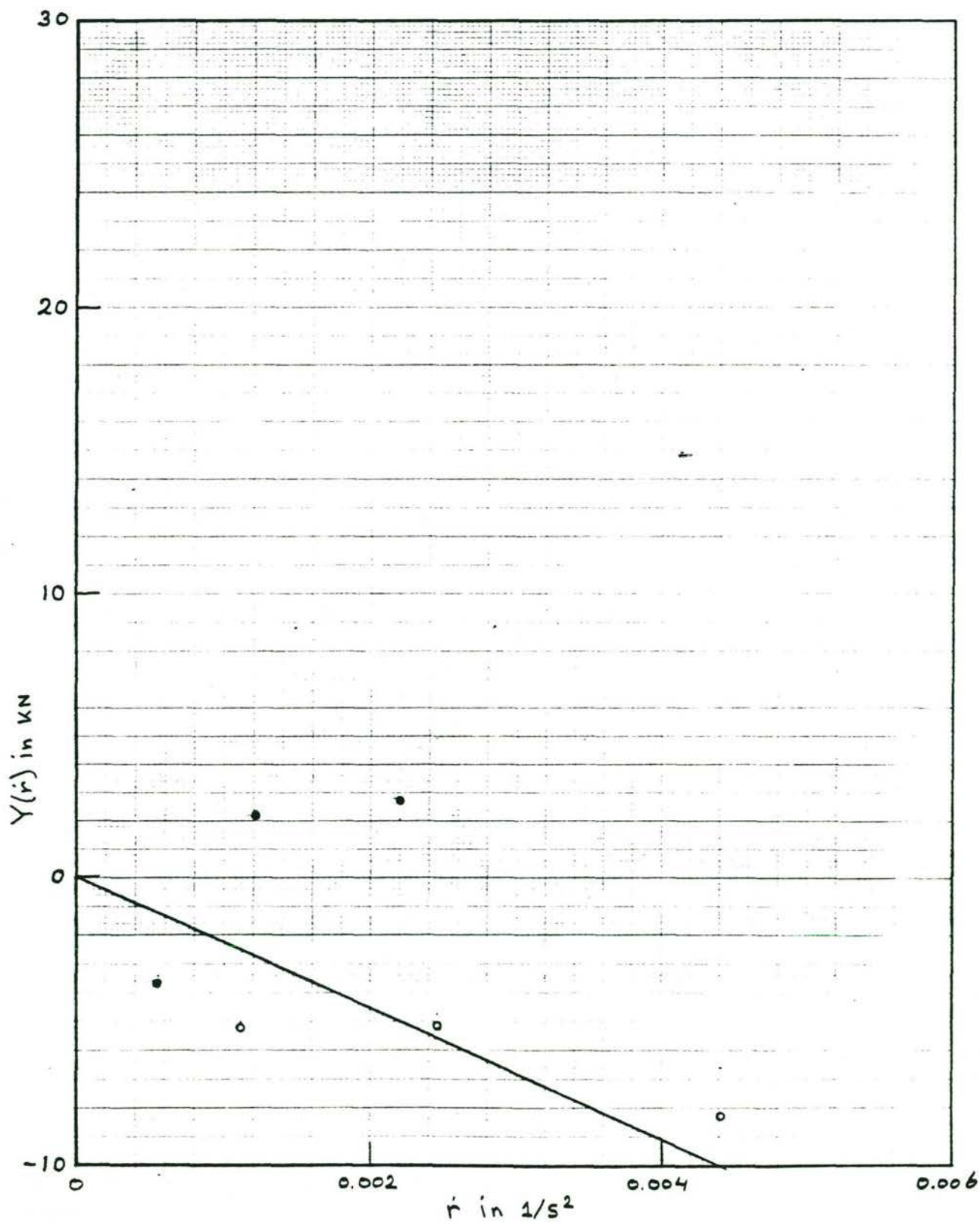
 drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder.
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

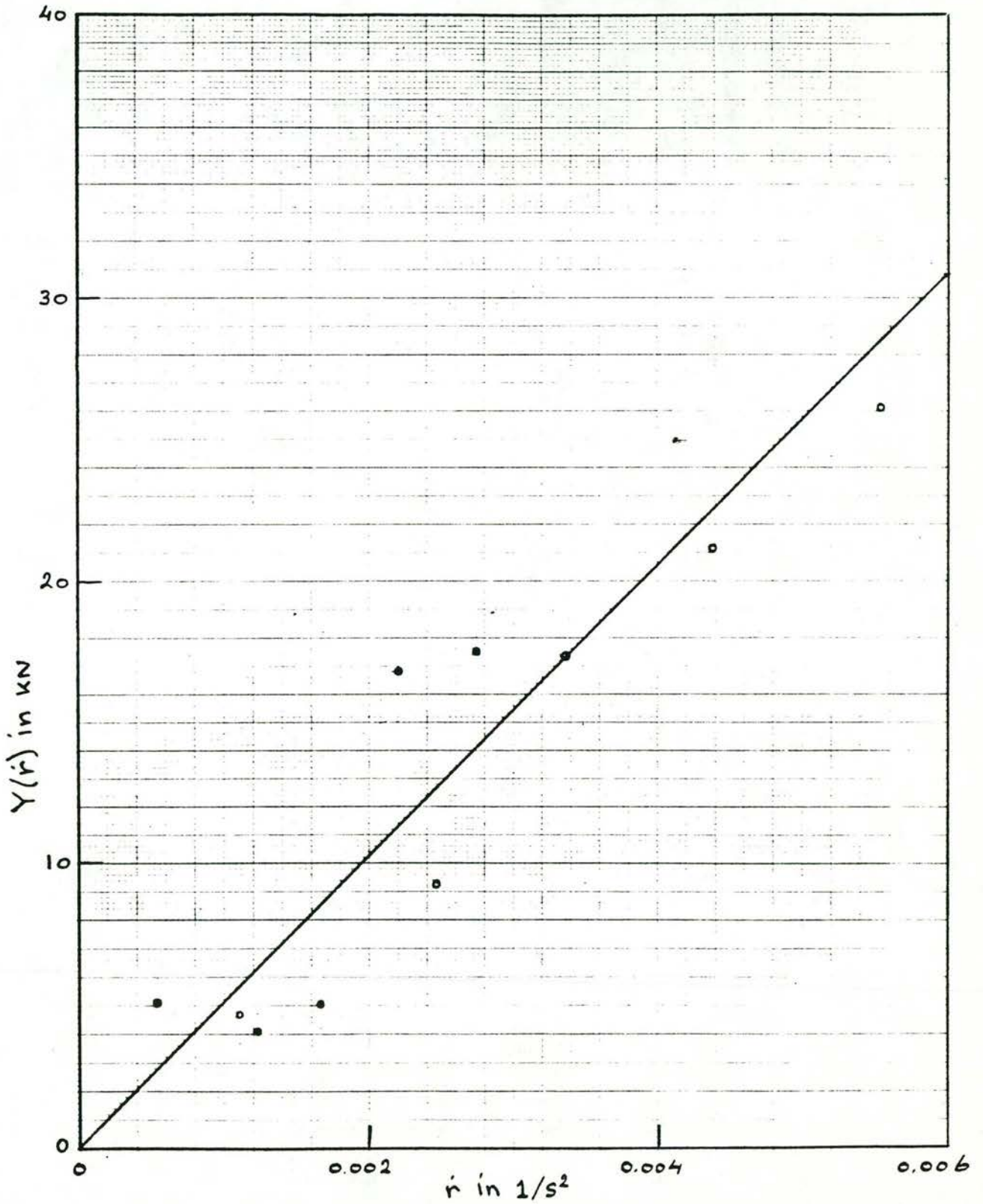
drifthoek : B= 16 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

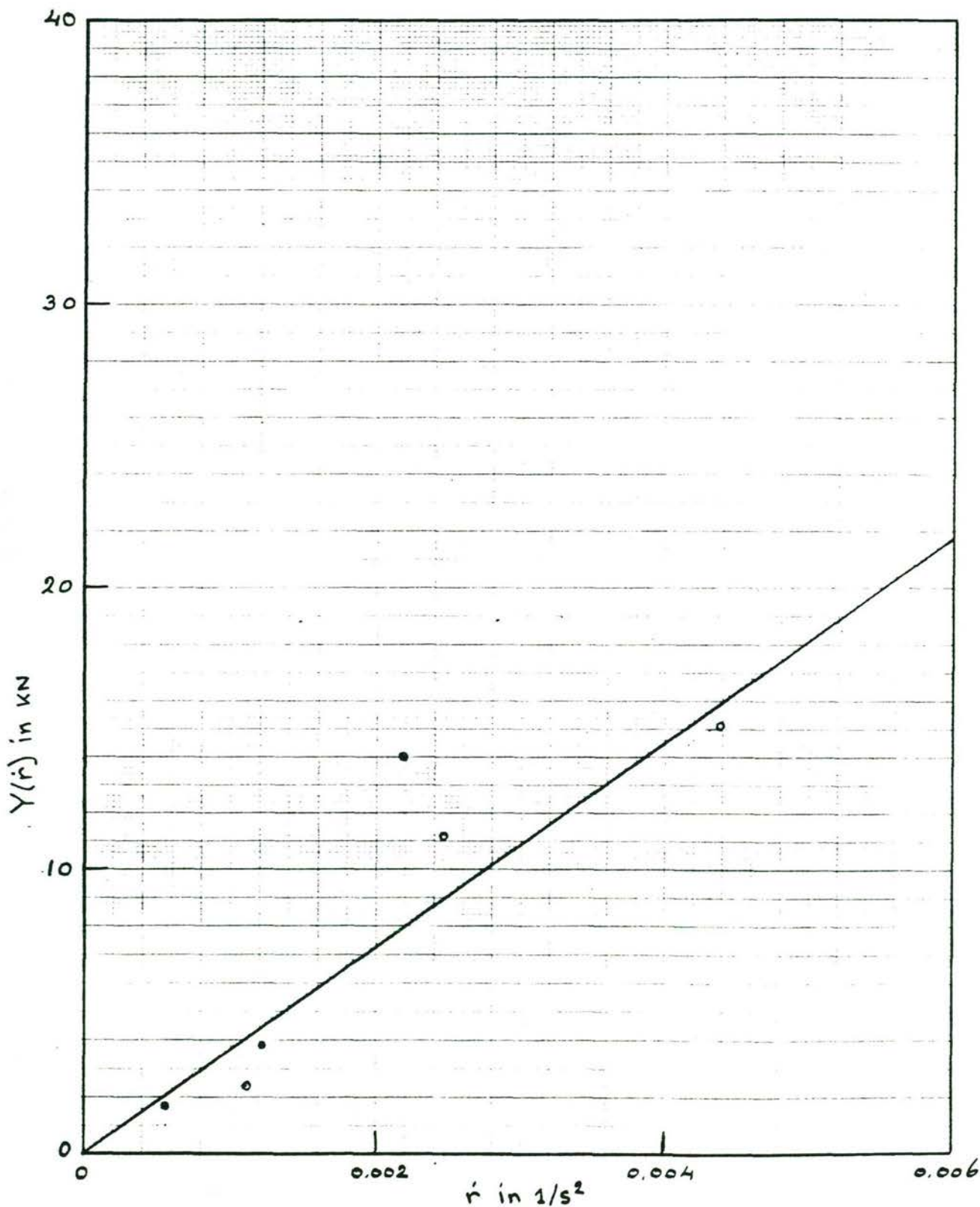
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

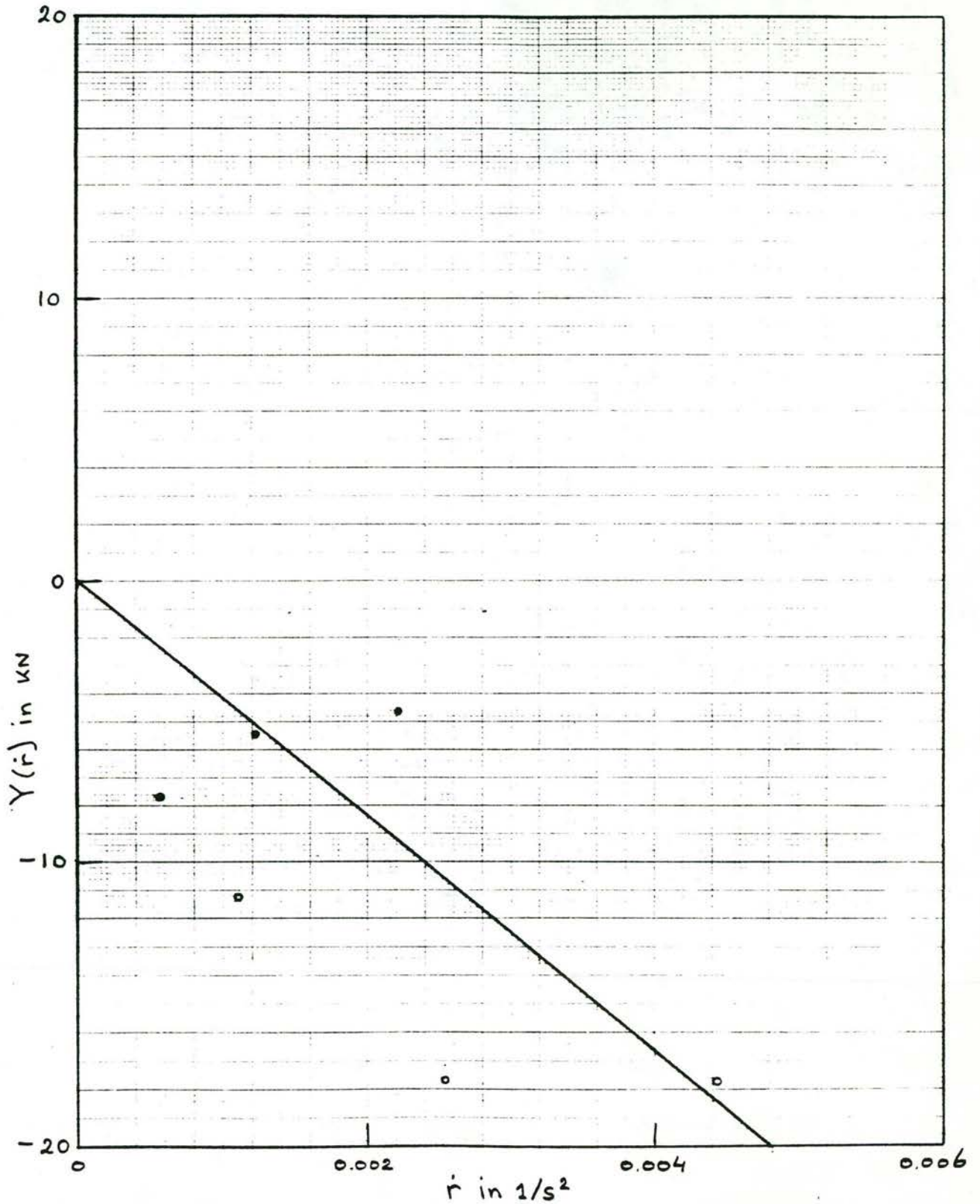
 drifthoek : $B = 8$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

drifthoek : $B = 16$ deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



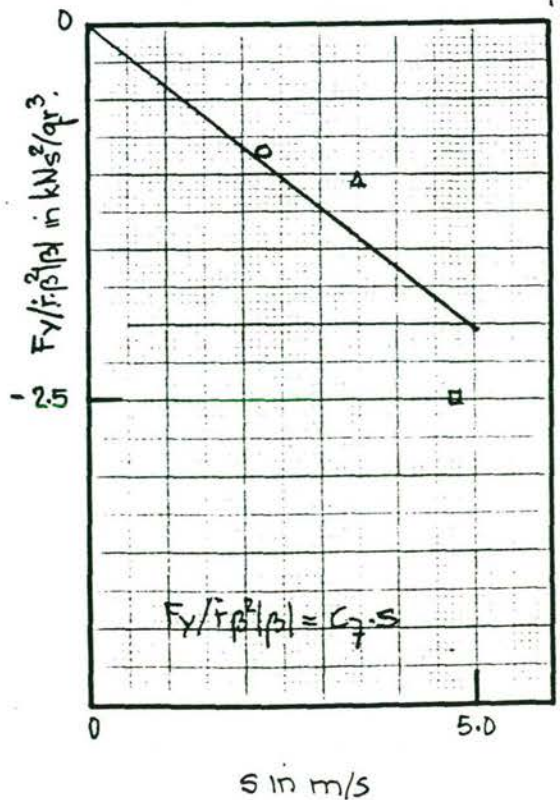
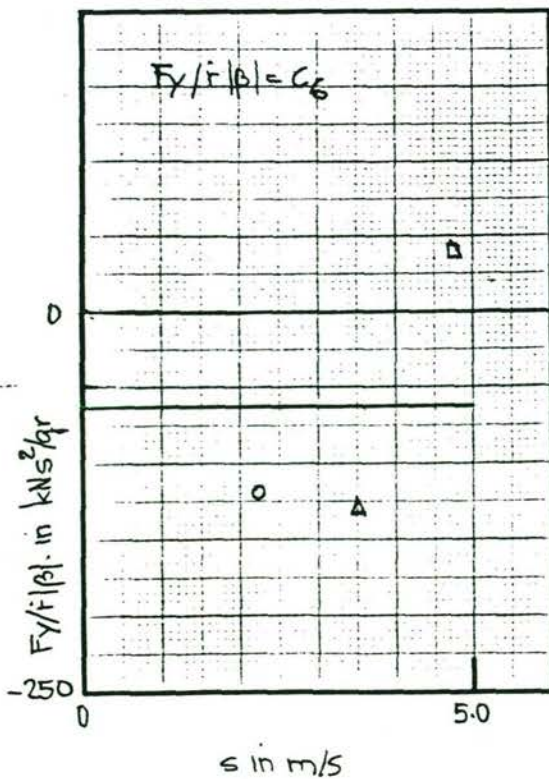
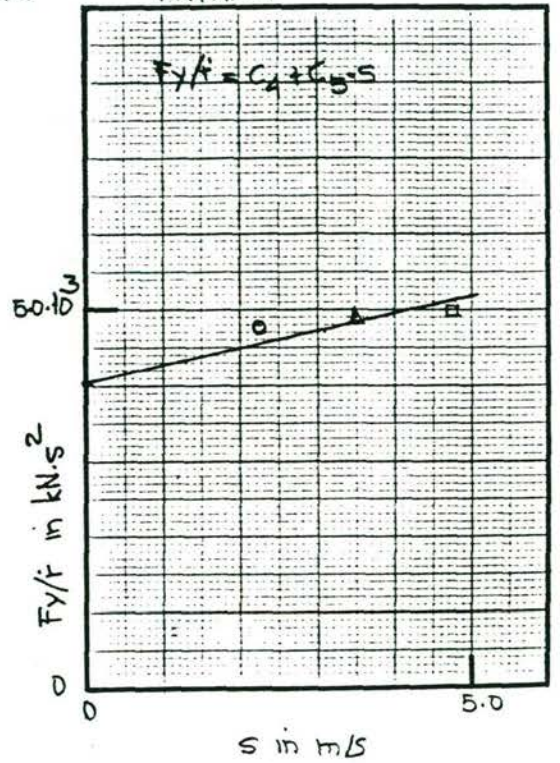
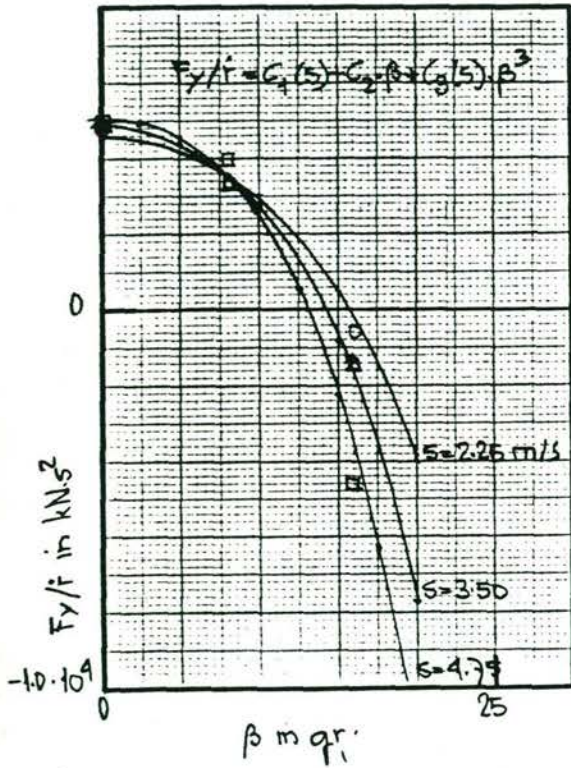
DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip ballast, breed water

$$F_y(\dot{r}) = Y_r \cdot \dot{r} + Y_{r\dot{s}} \cdot \dot{r} \cdot s + Y_{r|\dot{\beta}|} \cdot \dot{r} |\dot{\beta}| + Y_{r\dot{\beta}|\dot{\beta}|s} \cdot \dot{r} \cdot \dot{\beta}^2 |\dot{\beta}| \cdot s$$

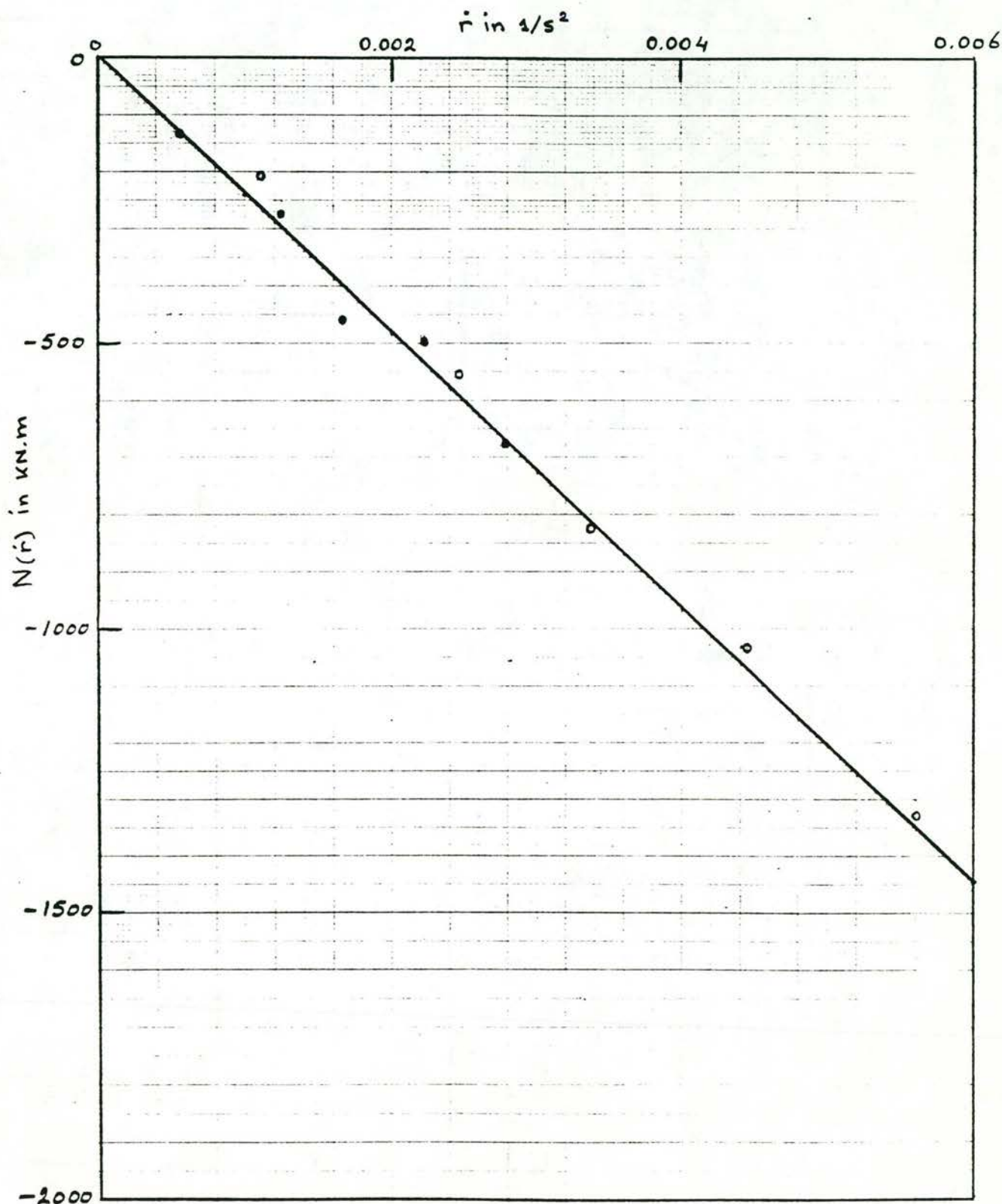
$$\hat{=} Y_r \cdot \dot{r} + Y_{r\dot{u}} \cdot \dot{r} \cdot u + Y_{r|v|u} \cdot \dot{r} |v| u + Y_{r|v|v|u^2} \cdot \dot{r} |v|^2 |u|^2$$



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

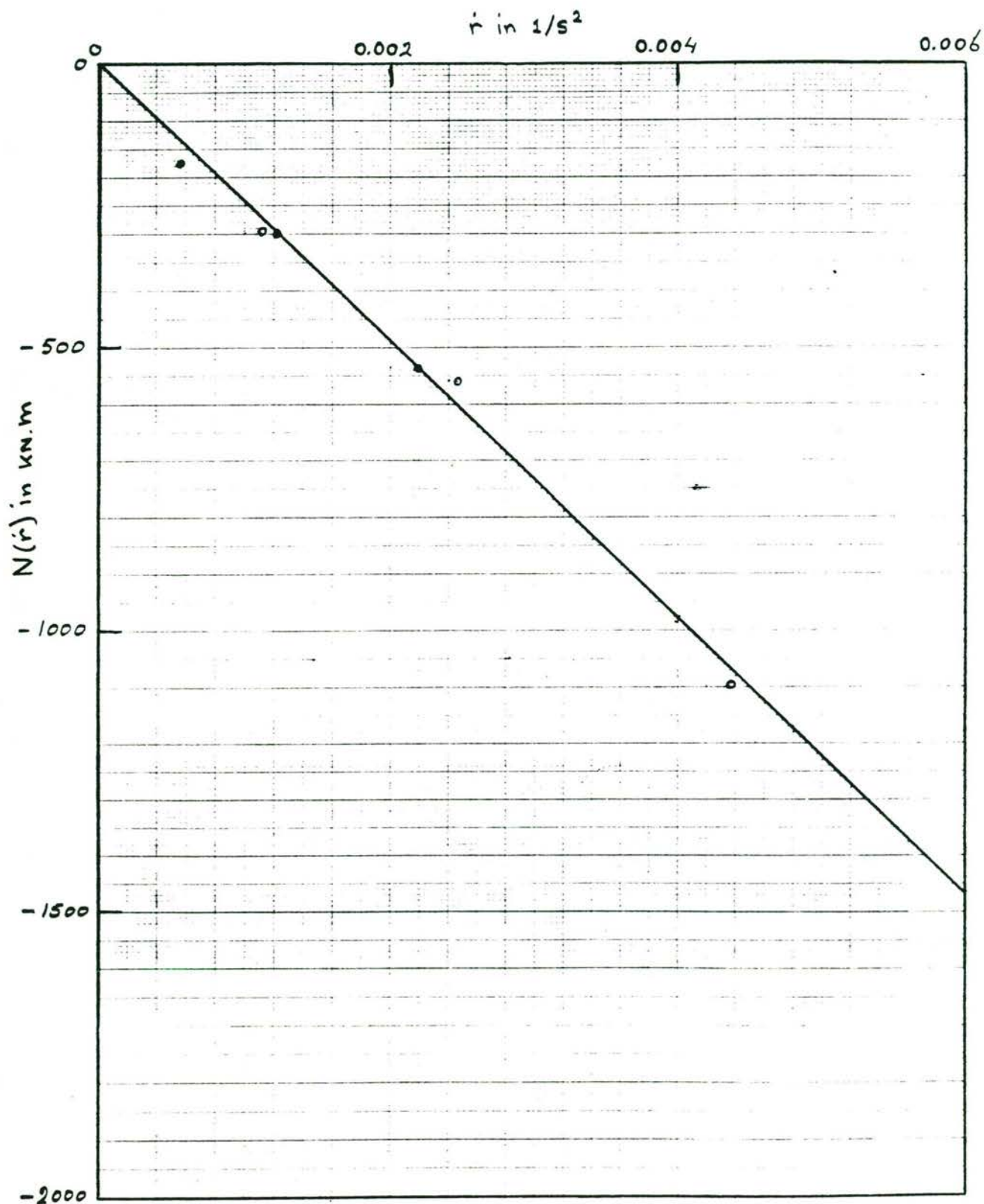
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

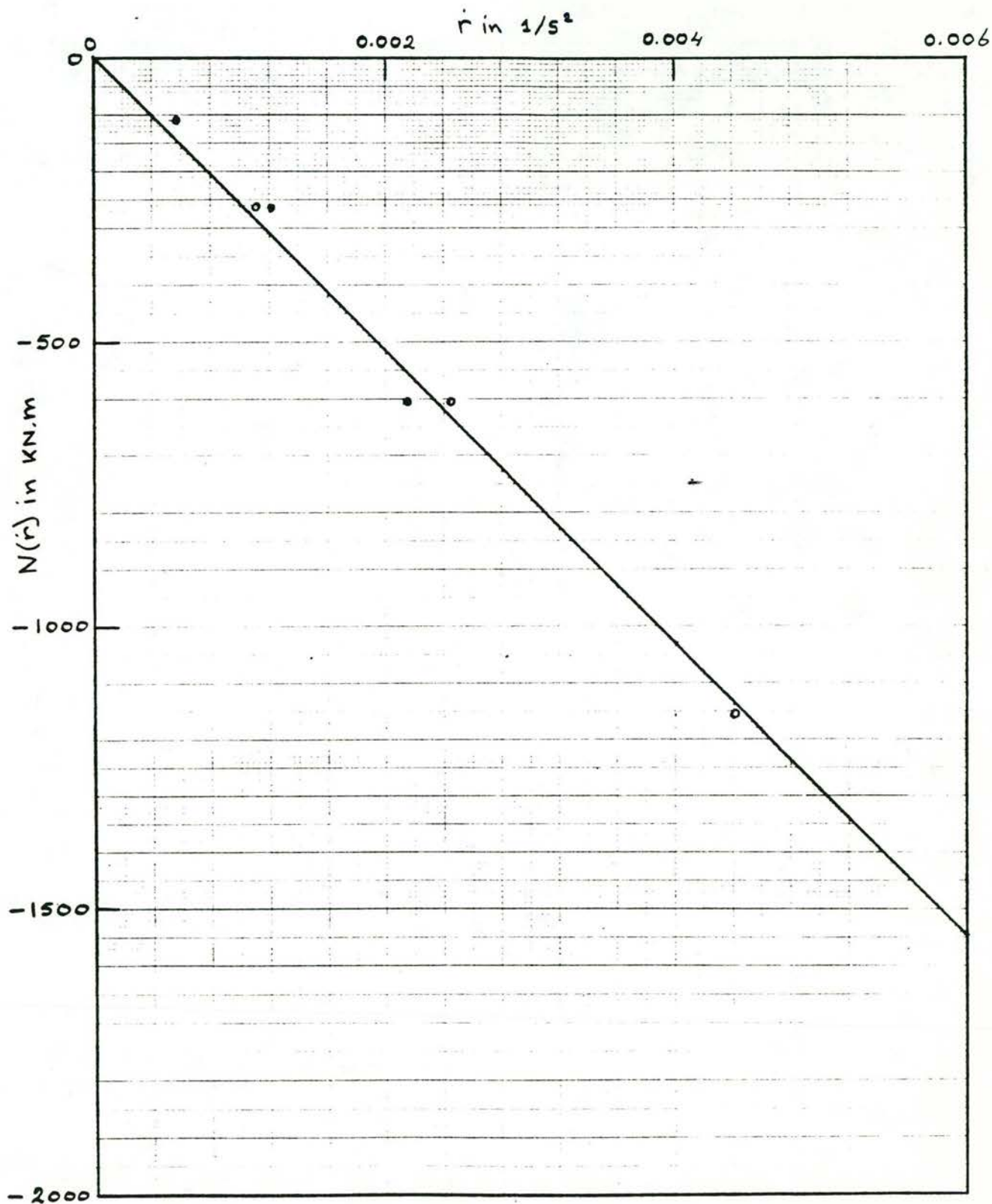
drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 2.25 m/s)

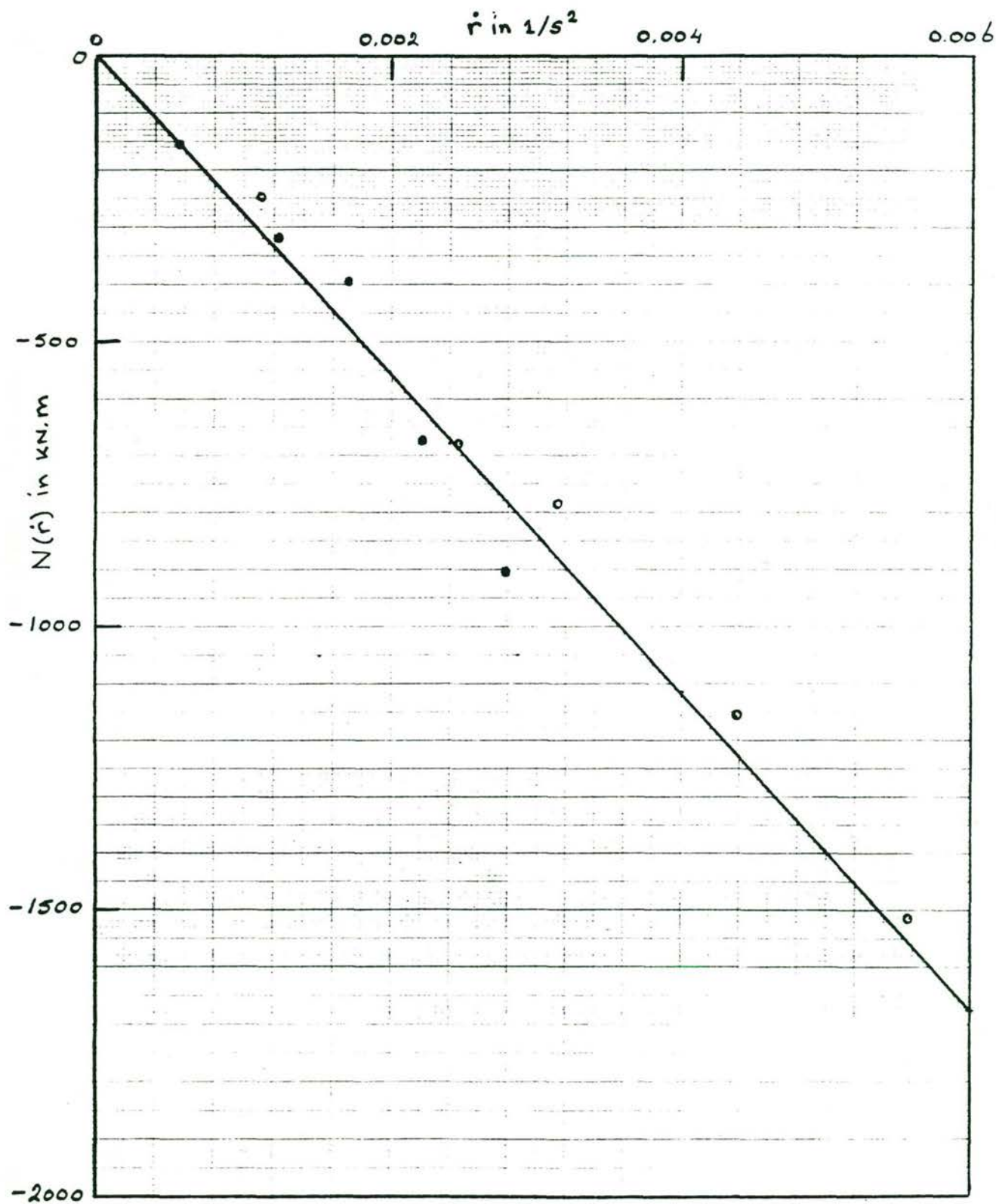
drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

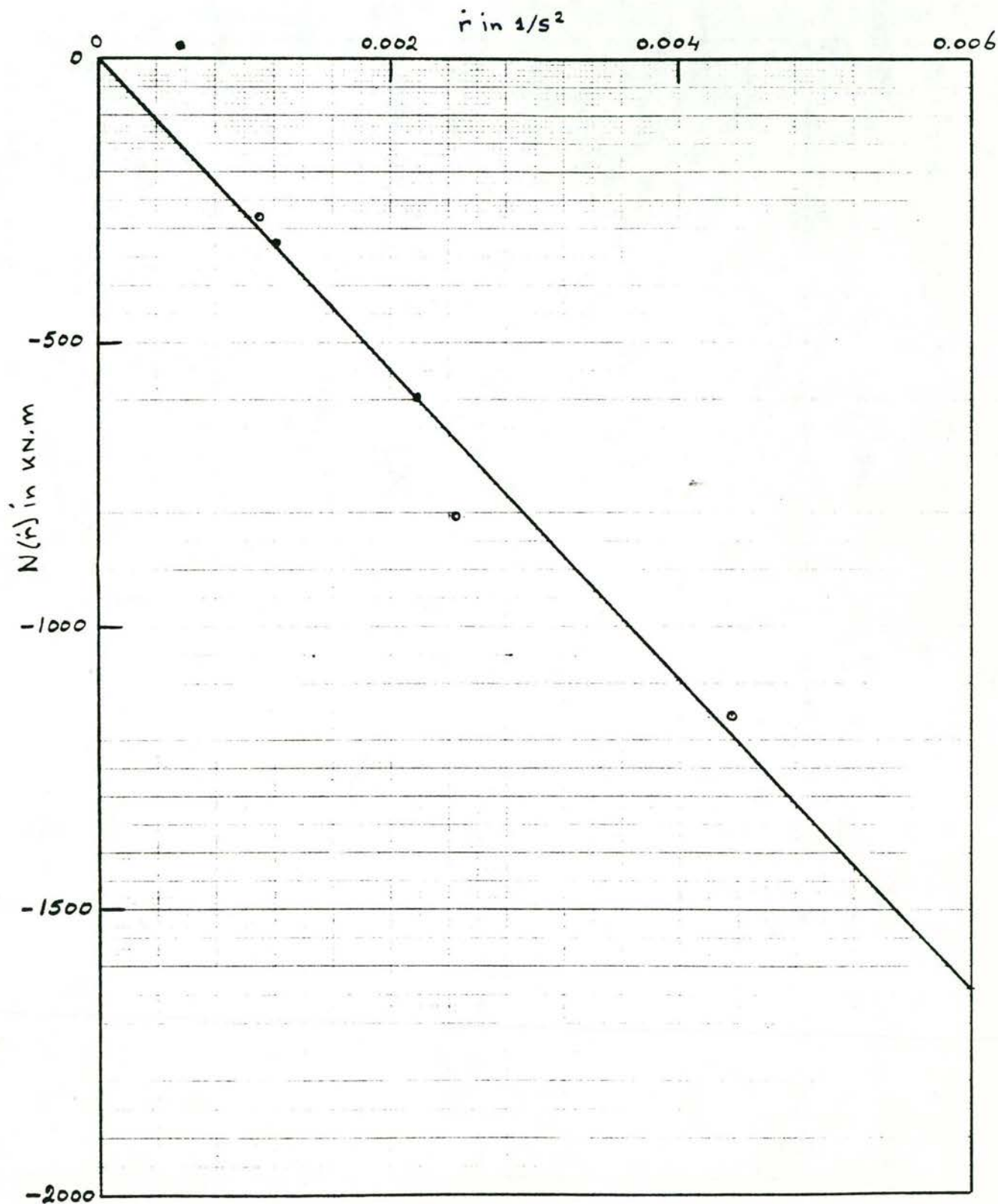
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

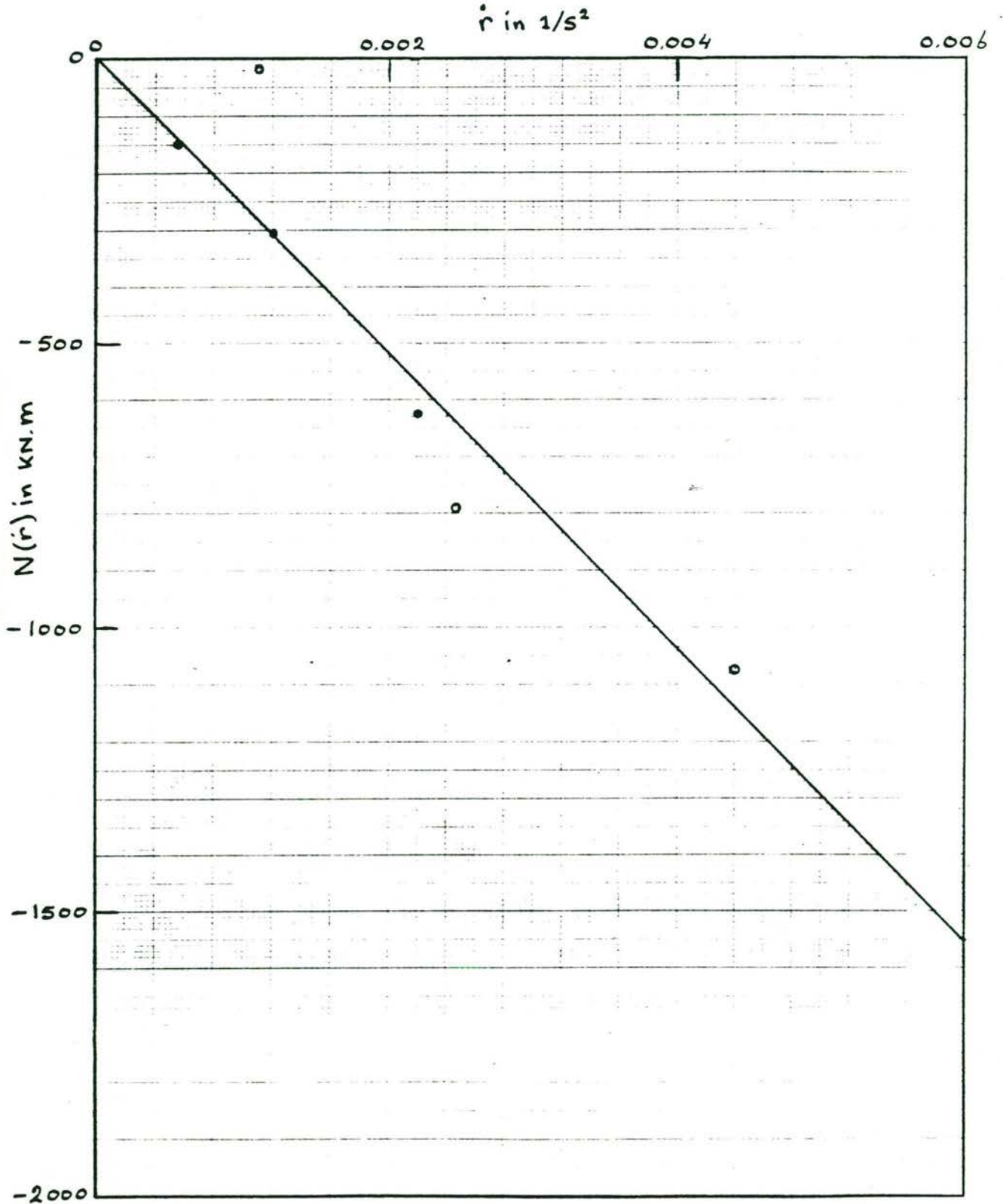
drifthoek : B= 8 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast , breed water

GIER OSCILLATIE PROEVEN (SNELHEID 3.50 m/s)

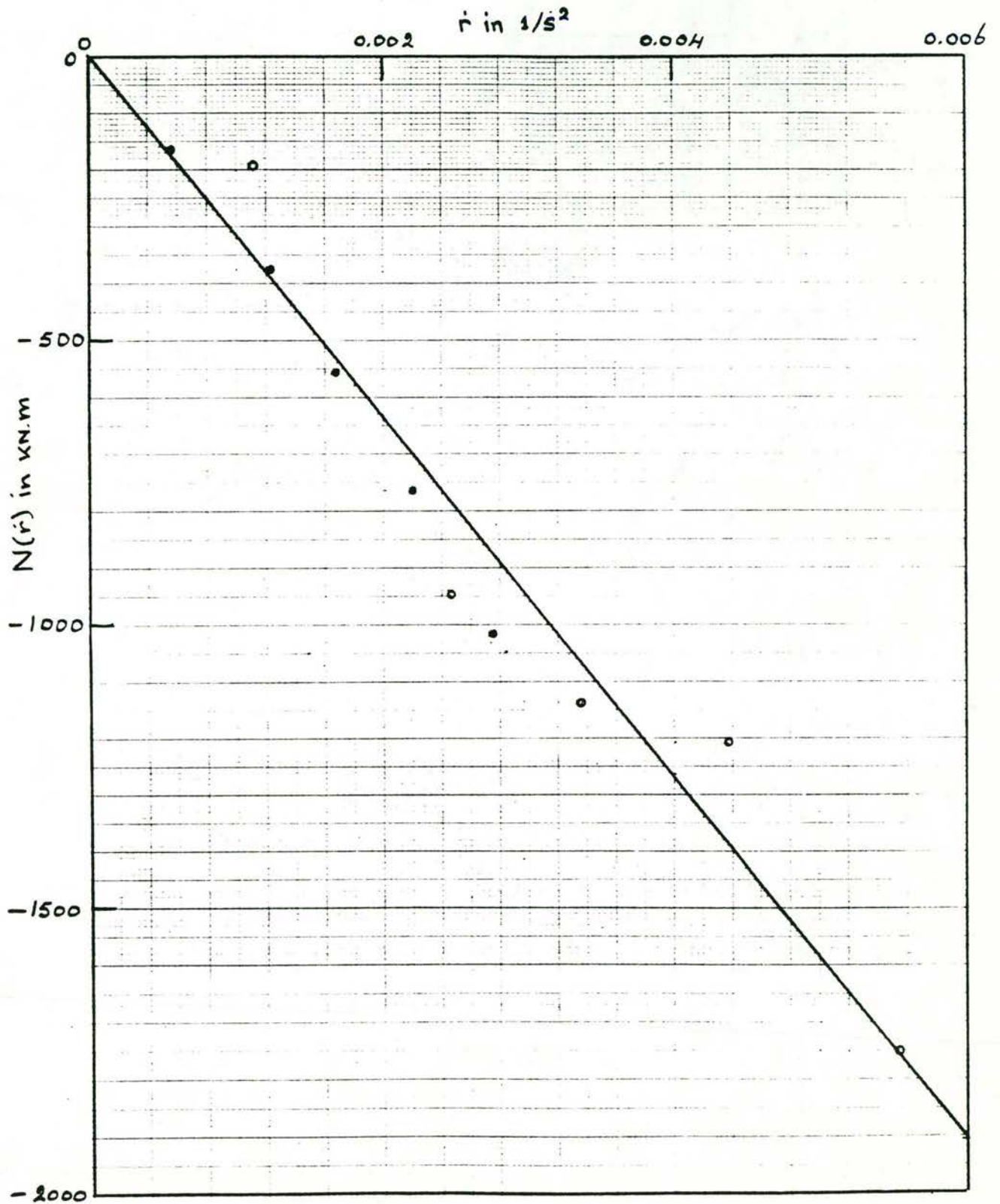
drifthoek : B= 16 deg
amplitude 5.0 graden : ●
amplitude 10.0 graden : ○



DVK Projekt Windhinder.
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

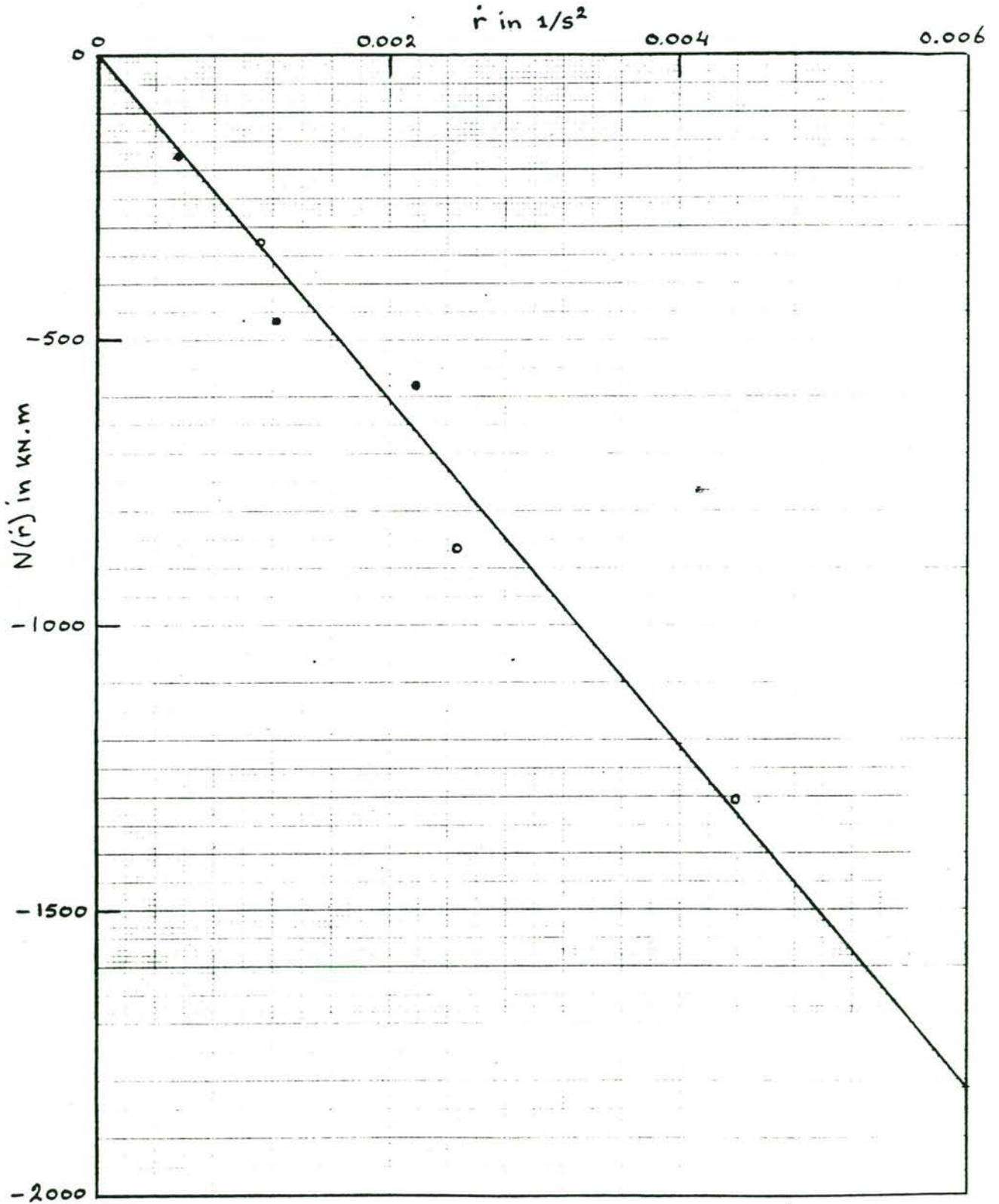
drifthoek : B= 0 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
 rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

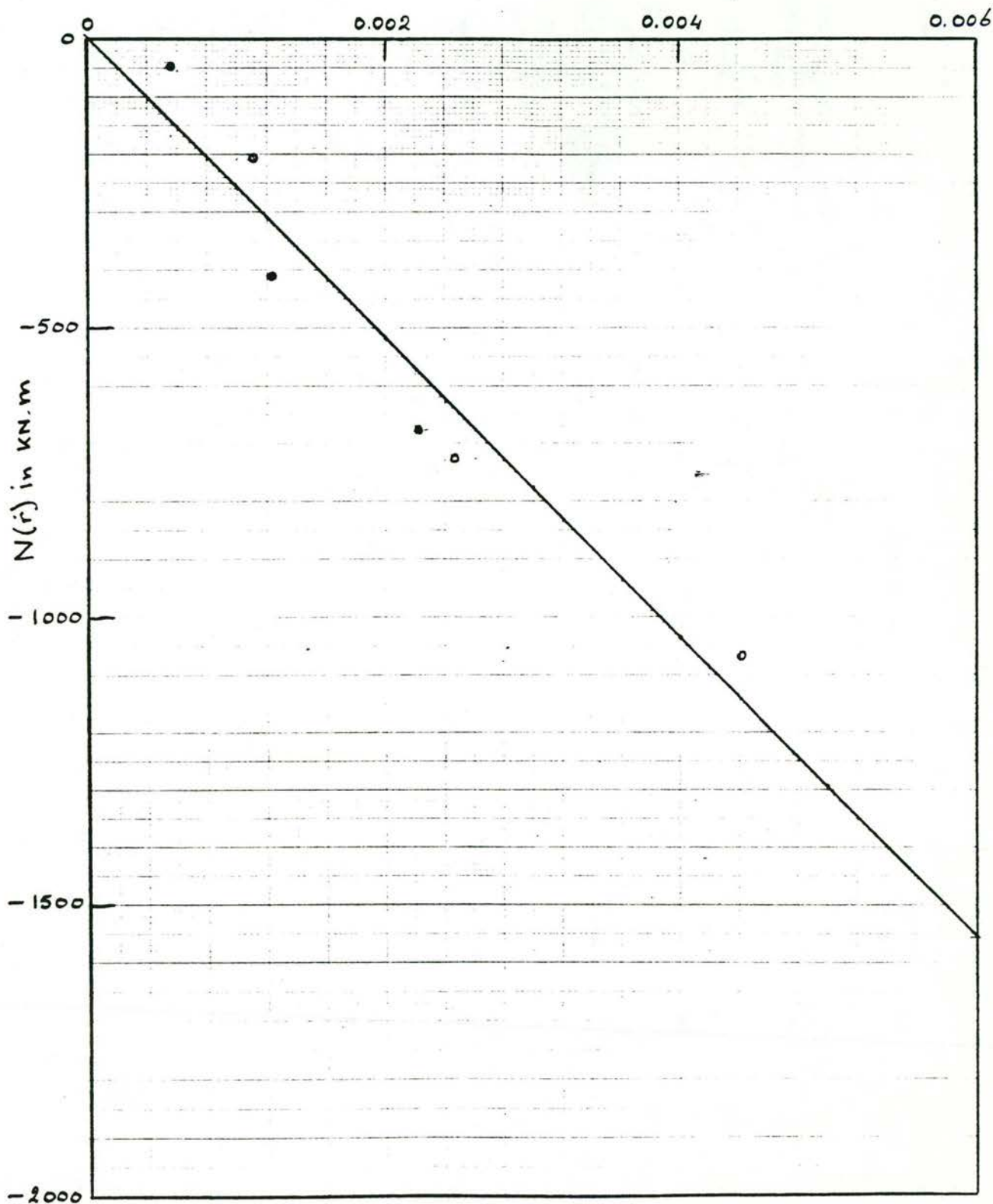
 drifthoek : B= 8 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder
rijn-herne: ballast, breed water

GIER OSCILLATIE PROEVEN (SNELHEID 4.75 m/s)

drifthoek : B= 16 deg
 amplitude 5.0 graden : ●
 amplitude 10.0 graden : ○



DVK Projekt Windhinder

COEFFICIENTEN UIT GIEROSCILLATIEPROEVEN

rijn-herne kanaal schip ballast, breed water

$$M_z(\dot{r}) = N_f \cdot \dot{r} + N_{fs} \cdot \dot{r} \cdot s + N_{f\beta s} \cdot \dot{r} \beta^2 + N_{f\beta s} \cdot \dot{r} \beta^2 s$$

$$\hat{=} N_f \cdot \dot{r} + N_{fu} \cdot \dot{r} \cdot u + N_{fvv/4u} \cdot \dot{r} v^2/4^2 + N_{fvv/4} \cdot \dot{r} v^2/4$$

