Comparative Study of Different Polynominal Formulations for the Residuary Resistance of the Systematic Delft Series Model 1 to 28.

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Problem:

The race performance of light displacement IMS yachts have led to the suspicion, that the IMS approximation of the residuary resistance favours the light displacement boats. Since there are tank test data available for the systematic Delft Series an attempt to compare the residual resistances obtained by the IMS boat model is to be made. Alternatives for the formulation of an IMS boat model have been discussed by the ITC working group and should be part of a comparative study.

Prof. Gerritsma and his co-workers [1] have shown that the Delft tank test results are well represented by a polynominal expression of the prismatic coefficient, the location of the longitudinal center of bouyancy, the beam to depth ratio, and the length to cube-root of displacement ratio in the speed range up to Froude No. .45. In the higher speed regime a rather simple polynominal expression of the length to beam ratio and the waterline to square of the cube root of the displacement ratio fits the measured data well.

Since the IMS boat model is based on integrated hull parameters, their feasability for a similar polynominal formulation has to be investigated.

Materials and Method:

Of all 28 Delft models the standard IMS LPP output has been provided by Jan van Berkel of NKWV. The complete set of measured resistance data of the systematic series was supplied by the Ship Hydrodynamics Laboratory of the Delft University.

A computer program system was set up to

- calculate the IMS residual resistance for the speeds in question
- generate a program to easily set up differing polynominal expressions
- solve the linear simultaneous equations
- generate graphical and tabular results
- run an IMS test fleet

From an early Basic-VPP of Charles L. Poor those program modules have been extracted which permit to calculate the IMS Rr on the Basis of the inputs of the IMS-DISPL, B, and T. On the input of these parameters the program calculates the IMS Rr for speeds from Fn=.125 to .6, to cover the total speed range. The output is a file which is imported by the consecutive programs.

The calculation of the parameter matrix for the set of simultaneous linear equations and their solution as well as the graphical presentation was done by means of the MATLAB program system of the MATH WORKS Inc.

The ITC working group had agreed to try at first the same polynominal expression as Delft proposes, however, to replace the model dimensions with integrated quantities calculated by means of the LPP.

Since the prismatic coefficient is higly dependent on the keel volume, a second test had been performed using the prismatic coefficient and the volume of the canue body with stripped appendages.

A third test had been performed replacing the term with the linear and quadratic Cp term with a corresponding term representing something like a waterline area coefficient

Cwl= (Awl/(LSM1*B)).

A forth test had been performed setting the prismatic coefficient to zero.

A fith test uses the IMS-BTR and L/(VOL^1/3) with a linear and a quadratic term each and a linear cross-term.

The polynominal equations used are the follcwing:

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I.  Fn <= .45
Rr/DISPL*10^3=A0+A1*Cp+A2*LCB+A3*B/T+A4*L/(VOL^(1/3))
          +A5*Cp^2+A6*Cp*L/(VOL^(1/3))+A7*LCB^2
          +A8*(L/(VOL^(1/3))^2+A9*(L/(VOL^(1/3))^3
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This set of equations was used with the Delft geometrical model data, the IMS Cp and VOL data of the total hull, and with the IMS Cp and VOL data of the canue body.

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II. Fn <= .45
 Rr/DISPL*10^3=A0+A1*Cwl+A2*LCB+A3*B/T+A4*L/(VOL^(1/3))
          +A5*Cwl^2+A6*Cp*L/(VOL^(1/3))+A7*LCB^2
          +A8*(L/(VOL^(1/3))^2+A9*(L/(VOL^(1/3))^3

III. Fn <= .45
 Rr/DISPL*10^3=A0+A1*LCB+A2*B/T+A3*L/(VOL^(1/3))+A4*LCB^2
          +A5*(L/(VOL^(1/3))^2+A6*(L/(VOL^(1/3))^3

IV.  Fn <= .45
 Rr/DISPL*10^3=A0+A1*BTR+A2*BTR^2+A3*L/(VOL^(1/3))
          +A4*L/(VOL^(1/3))^2+A5*BTR*(L/(VOL^(1/3))
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and for the higher speed regime:

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    Fn > .45
 Rr/DISPL*10^3=B0+B1*L/B+B2*Aw/(DISPL^(2/3))+B3*(L/B)^2
          +B4*(Aw/(DISPL^(2/3)))^3
```

The parameters are :

Rr	residual resistance
DISPL	displacement in sailing trim
VOL	respective displaced volume
LCB	longitudinal position of the center of bouyancy in percent of the LSM1 forward and aft of the LWL/2
Aw	integrated waterline plane between the planes 1% L above and below the floatation line
Cp	prismatic coefficient

The simultaneous linear equations were set up for Froude No. ranging from .125 to .45 for all 28 models and from .45 to .6 for the high speed models.

Results:

Table 1 shows the model parameters of the Delft Series, Table 2 shows the matrix of parameters of the 28 simultaneous linear equations of the low speed regime and the six of the high speed regime, Table 3 shows the measured residual resistances, Table 4 shows the polynominal coefficients, Table 5 shows the standard deviation of the residuals for the low and high speed regime, and Table 6 shows the corresponding IMS-Rr values for Fn=.125 to .535.

Table 7 shows the integrated IMS model parameters of the Delft Series, Table 8 shows the matrix of parameters of the 28 simultaneous linear equations of the low speed regime and the six of the high speed regime on the basis of the integrated IMS parameters, Table 9 shows the respective polynominal coefficients, Table 10 shows the standard deviation of the residuals for the low and high speed regime.

The data of the other polynominals are presented alike:
Table 11 to 13 using Cp and VOL of the canue body
Table 14 to 16 using Cwl instead of the Cp terms
Table 17 to 19 using no Cp
Table 20 to 22 using BTR and L/(VOL^1/3).

Finally, Table 23 shows the standard deviation of the residuals for all models and all Froude No's as an indicator for the quality of the fit of the various polynominals.

In addition the measured and calculated Rr data are plotted in diagrams. The Delft results are shown for the low and high speed regime with the respective present IMS Rr results for comparison. For all other polynominals based in IMS data three sets of diagrams are presented. The first two containing the same information as the ones for the Delft polynominal and a third diagram which depicts the results of the application of the high speed polynominal to all 28 models togeter with the respective present IMS Rr results.

These results show that the iniatial idea of the ITC working group to fit together the present IMS boat model at low speeds with the Delft high speed polynominal is not workable.

The application of integrated data to generate a polynominal fit to the test data render surprisingly good results. Using the standard deviation of all residuals as a qualitative measure, the best results are obtained by using the polynominal equation set I with Cp and VOL of the canue body which appears to be as good as the Delft results. Marginally larger deviations from the measured data are obtained with the Cp and VOL from the entire hull followed by the polynominal where the linear and quadratic terms of Cp was substituted by the corresponding Cwl terms. Here the deviations in the low speed regime are much improved for the Models 23 and 27, which in no other parameter combination render satisfactory results. The highest deviations are observed by using the polynominal III which does not contain any term with Cp and polynominal IV which only containes terms with beam-depth and length-displacement ratios.

For the high speed regime the polynominal fit based on the integrated hull parameters is not as good as the Delft results, however the over all standard deviation is 1.9% of the lowest measured value. The application of this polynominal to the models 1 to 22 show in some instances unsatisfactory agreement between the high and low speed formulations at Fn=.45. To improve the appearance of the spline plot, generally the average between the two has been used.

The comparison of the tank test results with the Rr of the IMS boat model disclose that at the low speeds the agreement is not too bad, however the IMS-Rr's are slightly high at the low end crossing to lower IMS-Rs's at speeds of Fn=.275 to .325, while at the higher speeds the IMS resistance predictions are progressively low.

At higher speeds the IMS boat model appears to fit well the model No.8 only, all other models are predicted too fast starting for some models at speeds as low as Fn=.3. Particularly great disparities are observed for models 12 to 16 and 19 and 20. These models, which all have smaller Cp's than model 8, must loose under IMS against model 8 since the predicted speed difference for the 10m fullscale boat is as large as 0.5 kn.

Conclusion:

The exponential expression of the present IMS boat model does not represent the actual model resistances sufficiently.

In extension to the present polynominals alternative expressions including Cwl should be tried to obtain improvements at the low speed end.

To improve the fit of the high speed polynominal more test data are required of high displacement models and test data of light displacement models to confirm the proper fit of the polynominal in this parameter regime.

The obove ploynominal expressions should be used to recalculate known race results to study the effects on the IMS fleet particularly in respect of the light displacement and low Cp boats.

References:

[1] J. Gerritsma, J.A. Keuning and A. Versluis:
Upright Resistance of Sailing Yacht Hull Forms.
TU-Delft, Report No. 836, 1989.

Table 1

MODEL PARAMETERS OF
SYSTEMATIC DELFT SERIES

MODEL	Lwl	Bwl	Tc	Aw	DISPLc	LCB	Cp
01	10.04	3.17	0.790	21.8	9.180	-2.30	0.568
02	10.04	2.76	0.910	19.1	9.180	-2.30	0.569
03	10.06	3.64	0.680	25.2	9.160	-2.30	0.565
04	10.06	2.85	0.720	19.8	7.550	-2.30	0.564
05	10.05	3.64	0.920	25.3	12.100	-2.40	0.574
06	10.00	3.17	1.060	21.9	12.240	-2.40	0.568
07	10.06	3.17	0.640	21.8	7.350	-2.30	0.562
08	10.05	3.05	0.790	22.1	9.180	-2.40	0.585
09	10.07	3.28	0.790	21.5	9.180	-2.20	0.546
10	10.00	3.17	0.790	22.0	9.190	0.00	0.565
11	10.00	3.17	0.790	21.6	9.190	-5.00	0.565
12	10.00	2.85	0.720	19.8	7.520	0.00	0.565
13	10.00	2.85	0.720	19.4	7.520	-5.00	0.565
14	10.00	2.85	0.770	18.7	7.520	-2.30	0.530
15	10.00	3.16	0.860	20.8	9.290	-2.30	0.530
16	10.00	3.17	1.130	20.9	12.230	-2.30	0.530
17	10.00	3.17	0.750	23.0	9.170	0.00	0.600
18	10.00	3.17	0.750	22.6	9.170	-5.00	0.600
19	10.00	3.17	0.840	21.0	9.170	-0.00	0.530
20	10.00	3.17	0.840	20.6	9.170	-5.00	0.530
21	10.00	2.85	0.680	20.5	7.540	-2.30	0.600
22	10.00	3.66	0.860	26.3	12.260	-2.30	0.600
23	10.00	2.86	0.740	19.3	7.974	-1.90	0.548
24	10.00	2.86	0.261	19.0	2.995	-2.07	0.548
25	10.00	2.50	0.464	16.7	4.618	-1.94	0.548
26	10.00	2.50	0.194	16.7	1.972	-2.10	0.545
27	10.00	2.22	0.904	14.9	7.915	-1.89	0.548
28	10.00	2.22	0.329	14.6	2.922	-1.89	0.546

Table 2a

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (DELFT COEFFICIENTS)

MODEL	A0	A1	A2	A3	A4
01	1.0000	0.5680	-2.3000	4.0127	4.7950
02	1.0000	0.5690	-2.3000	3.0330	4.7950
03	1.0000	0.5650	-2.3000	5.3529	4.8080
04	1.0000	0.5640	-2.3000	3.9583	5.1280
05	1.0000	0.5740	-2.4000	3.9565	4.3776
06	1.0000	0.5680	-2.4000	2.9906	4.3392
07	1.0000	0.5620	-2.3000	4.9531	5.1741
08	1.0000	0.5850	-2.4000	3.8608	4.7997
09	1.0000	0.5460	-2.2000	4.1519	4.8093
10	1.0000	0.5650	0.0000	4.0127	4.7741
11	1.0000	0.5650	-5.0000	4.0127	4.7741
12	1.0000	0.5650	0.0000	3.9583	5.1042
13	1.0000	0.5650	-5.0000	3.9583	5.1042
14	1.0000	0.5300	-2.3000	3.7013	5.1042
15	1.0000	0.5300	-2.3000	3.6744	4.7569
16	1.0000	0.5300	-2.3000	2.8053	4.3403
17	1.0000	0.6000	0.0000	4.2267	4.7776
18	1.0000	0.6000	-5.0000	4.2267	4.7776
19	1.0000	0.5300	0.0000	3.7738	4.7776
20	1.0000	0.5300	-5.0000	3.7738	4.7776
21	1.0000	0.6000	-2.3000	4.1912	5.0997
22	1.0000	0.6000	-2.3000	4.2558	4.3368
23	1.0000	0.5480	-1.9000	3.8649	5.0054
24	1.0000	0.5480	-2.0700	10.9579	6.9375
25	1.0000	0.5480	-1.9400	5.3879	6.0050
26	1.0000	0.5450	-2.1000	12.8866	7.9744
27	1.0000	0.5480	-1.8900	2.4558	5.0178
28	1.0000	0.5460	-1.8900	6.7477	6.9948

Table 2b

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (DELFT COEFFICIENTS)

MODEL	A5	A6	A7	A8	A9
01	0.3226	2.7235	5.2900	22.9918	110.2449
02	0.3238	2.7283	5.2900	22.9918	110.2449
03	0.3192	2.7165	5.2900	23.1170	111.1472
04	0.3181	2.8922	5.2900	26.2965	134.8488
05	0.3295	2.5128	5.7600	19.1635	83.8905
06	0.3226	2.4646	5.7600	18.8284	81.6993
07	0.3158	2.9078	5.2900	26.7714	138.5181
08	0.3422	2.8079	5.7600	23.0376	110.5746
09	0.2981	2.6259	4.8400	23.1294	111.2361
10	0.3192	2.6974	0.0000	22.7924	108.8139
11	0.3192	2.6974	25.0000	22.7924	108.8139
12	0.3192	2.8839	0.0000	26.0528	132.9787
13	0.3192	2.8839	25.0000	26.0528	132.9787
14	0.2809	2.7052	5.2900	26.0528	132.9787
15	0.2809	2.5212	5.2900	22.6285	107.6426
16	0.2809	2.3004	5.2900	18.8386	81.7662
17	0.3600	2.8666	0.0000	22.8255	109.0512
18	0.3600	2.8666	25.0000	22.8255	109.0512
19	0.2809	2.5321	0.0000	22.8255	109.0512
20	0.2809	2.5321	25.0000	22.8255	109.0512
21	0.3600	3.0598	5.2900	26.0067	132.6260
22	0.3600	2.6021	5.2900	18.8079	81.5661
23	0.3003	2.7430	3.6100	25.0543	125.4076
24	0.3003	3.8017	4.2849	48.1285	333.8898
25	0.3003	3.2908	3.7636	36.0604	216.5440
26	0.2970	4.3460	4.4100	63.5910	507.0994
27	0.3003	2.7498	3.5721	25.1787	126.3424
28	0.2981	3.8191	3.5721	48.9268	342.2314

Table 2c

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (DELFT COEFFICIENTS)

MODEL	B0	B1	B2	B3	B4
23	1.0000	3.4965	4.8355	12.2255	395.3242
24	1.0000	3.4965	9.1444	12.2255	2673.6289
25	1.0000	4.0000	6.0221	16.0000	873.5777
26	1.0000	4.0000	10.6197	16.0000	4790.6626
27	1.0000	4.5045	3.7516	20.2906	237.8505
28	1.0000	4.5045	7.1433	20.2906	1641.8942

Table 3a

POLYNOMINAL COEFFICIENTS
DELFT

	Fn .125	.150	.175	.200	.225
A0	-6.8356	-2.7371	-1.0533	4.6599	23.8043
A1	38.3221	35.2288	23.9135	-5.6499	-52.5845
A2	-0.0089	0.0001	0.0135	0.0314	0.0849
A3	0.0550	0.0486	0.0655	0.0846	0.1467
A4	-1.9288	-3.5472	-2.5830	-0.6614	-3.1585
A5	-39.2980	-38.7236	-32.4628	-15.5035	7.9153
A6	1.0775	1.5986	2.4609	4.7032	9.1579
A7	-0.0022	-0.0014	0.0003	0.0035	0.0127
A8	0.2505	0.4874	0.2441	-0.3340	-0.3322
A9	-0.0164	-0.0296	-0.0159	0.0187	0.0185

	Fn .250	.275	.300	.325	.350
A0	26.5013	42.0783	47.4499	90.4580	213.8948
A1	-75.4888	-116.6535	-188.6922	-397.1062	-802.6366
A2	0.1541	0.2101	0.3574	0.6146	1.0881
A3	0.1840	0.2449	0.3301	0.4495	0.5255
A4	-1.0555	-3.2477	3.6817	11.5547	10.4115
A5	23.7150	53.3892	133.1306	332.0077	664.8156
A6	10.7497	13.4529	11.5120	9.3093	13.3140
A7	0.0255	0.0364	0.0668	0.1035	0.1664
A8	-0.8517	-0.7259	-1.7474	-2.8825	-3.0483
A9	0.0482	0.0403	0.0973	0.1594	0.1661

	Fn .375	.400	.425	.450
A0	334.7003	561.7813	729.1954	1169.3107
A1	-1075.0341	-1586.1635	-1655.5085	-2646.4160
A2	1.6373	2.0118	2.4152	3.1393
A3	0.5246	0.2656	0.0234	0.2709
A4	-1.7439	-30.0968	-81.4735	-131.1603
A5	817.9047	1132.4540	893.3958	1399.3051
A6	27.2559	51.6809	114.9418	195.5713
A7	0.2373	0.2870	0.3609	0.5150
A8	-2.4689	-0.0660	1.9395	1.2844
A9	0.1401	0.0125	-0.0673	0.0186

Table 3b

POLYNOMINAL COEFFICIENTS
DELFT

	Fn .450	.475	.500	.525	.550
B0	111.3138	177.4385	327.5147	353.0808	426.6541
B1	-18.5754	-34.9190	-87.5544	-86.6235	-111.0194
B2	-4.0012	-6.8474	-11.6381	-13.6853	-15.8428
B3	1.6665	3.2815	9.1820	8.5881	11.2207
B4	0.0033	0.0058	0.0108	0.0125	0.0146

	Fn .575	.600
B0	445.2872	450.6643
B1	-112.4253	-108.7802
B2	-16.8731	-17.5479
B3	11.1468	10.5025
B4	0.0156	0.0161

Table 4a

MEASURED RESIDUAL RESISTANCE VALUES
LOW SPEED RANGE

MODEL	Fn .125	.150	.175	.200	.225	.250	.275
01	0.110	0.270	0.470	0.780	1.180	1.820	2.610
02	0.040	0.170	0.370	0.660	1.060	1.590	2.330
03	0.090	0.290	0.560	0.860	1.310	1.990	2.940
04	0.200	0.350	0.650	0.930	1.370	1.970	2.830
05	0.160	0.230	0.350	0.540	0.850	1.310	2.080
06	0.120	0.260	0.430	0.690	1.090	1.670	2.460
07	0.280	0.440	0.700	1.070	1.570	2.230	3.090
08	0.200	0.380	0.640	0.970	1.360	1.980	2.910
09	0.150	0.320	0.550	0.860	1.240	1.760	2.490
10	0.110	0.240	0.490	0.790	1.280	1.960	2.880
11	0.070	0.180	0.400	0.700	1.140	1.830	2.770
12	0.080	0.260	0.500	0.830	1.280	1.900	2.680
13	0.080	0.240	0.450	0.770	1.190	1.760	2.590
14	0.080	0.250	0.460	0.750	1.110	1.570	2.170
15	0.100	0.230	0.470	0.760	1.150	1.650	2.280
16	0.050	0.170	0.350	0.630	1.010	1.430	2.050
17	0.030	0.180	0.400	0.730	1.300	2.160	3.350
18	0.060	0.150	0.340	0.630	1.130	1.850	2.840
19	0.160	0.320	0.590	0.920	1.370	1.940	2.620
20	0.090	0.240	0.470	0.780	1.210	1.850	2.620
21	0.010	0.160	0.390	0.730	1.240	1.960	3.040
22	0.040	0.170	0.360	0.640	1.020	1.620	2.630
23	0.010	0.100	0.200	0.380	0.700	1.200	1.900
24	0.300	0.500	0.800	1.100	1.800	2.500	3.450
25	0.050	0.150	0.500	0.800	1.300	1.950	2.750
26	0.020	0.200	0.700	1.400	2.150	3.150	4.100
27	0.010	0.100	0.200	0.300	0.500	0.950	1.450
28	0.050	0.400	0.700	1.000	1.400	2.000	2.800

Table 4b

MEASURED RESIDUAL RESISTANCE VALUES
LOW SPEED RANGE

				Fn			
MODEL	.300	.325	.350	.375	.400	.425	.450
01	3.760	4.990	7.160	11.930	20.110	32.750	49.490
02	3.290	4.610	7.110	11.990	21.090	35.010	51.800
03	4.210	5.540	8.250	13.080	21.400	33.140	50.140
04	3.990	5.190	8.030	12.860	21.510	33.970	50.360
05	3.060	4.490	6.690	11.530	19.550	32.900	50.450
06	3.430	4.620	6.860	11.560	20.630	34.500	54.230
07	4.090	5.820	8.280	12.800	20.410	32.340	47.290
08	4.350	5.790	8.040	12.150	19.180	30.090	44.380
09	3.450	4.830	7.370	12.760	21.990	35.640	53.070
10	4.140	5.960	9.070	14.930	24.130	38.120	55.440
11	4.120	5.410	7.870	12.710	21.020	34.580	51.770
12	3.760	5.570	8.760	14.240	23.050	35.460	51.990
13	3.850	5.270	7.740	12.400	20.910	33.230	49.140
14	2.980	4.420	7.840	14.110	24.140	37.950	55.170
15	3.090	4.410	7.510	13.770	23.960	37.380	56.460
16	2.730	3.870	7.190	13.960	25.180	41.340	62.420
17	5.060	7.140	10.360	15.250	23.150	34.620	51.500
18	4.340	6.200	8.620	12.490	20.410	32.460	50.940
19	3.700	5.450	9.450	16.310	27.340	41.770	60.850
20	3.690	5.070	7.950	13.730	23.550	37.140	55.870
21	4.460	6.310	8.680	12.390	20.140	31.770	47.130
22	4.150	6.000	8.470	12.270	19.590	30.480	46.660
23	2.700	4.000	6.200	11.000	20.500	33.200	47.900
24	4.500	6.250	9.050	13.850	21.500	30.250	39.900
25	3.700	5.000	7.800	12.300	20.900	31.000	42.700
26	5.600	7.750	10.500	14.700	20.900	28.150	37.000
27	2.000	3.050	5.500	11.300	21.400	34.000	48.000
28	3.700	5.000	7.500	12.000	20.000	29.100	37.600

Table 4c

MEASURED RESIDUAL RESISTANCE VALUES
HIGH SPEED RANGE

MODEL	Fn .450	.475	.500	.525	.550	.575	.600
23	47.900	63.900	80.900	93.800	105.000	113.500	120.500
24	39.900	49.000	56.700	63.500	69.600	75.300	81.000
25	42.700	54.250	63.700	72.500	79.400	85.800	91.900
26	37.000	45.000	52.000	58.300	63.800	69.400	74.400
27	48.000	63.100	79.000	88.900	98.100	105.000	111.500
28	37.600	46.600	53.300	59.700	65.200	70.500	75.100

Table 5

STANDARD DEVIATION OF RESIDUALS FOR
DELFT POLYNOMINAL LOW SPEED RANGE

Fn

.125	.150	.175	.200	.225	.250	.275
0.05394	0.07507	0.10024	0.13588	0.15838	0.18583	0.22467

Fn

.300	.325	.350	.375	.400	.425	.450
0.31042	0.31996	0.42880	0.47835	0.52908	0.90350	1.54245

DELFT POLYNOMINAL HIGH SPEED RANGE

Fn

.450	.475	.500	.525	.550	.575	.600
0.71536	0.64515	0.62859	0.12796	0.16435	0.41493	0.24428

Table 6a

RESIDUAL RESISTANCE DATA
FROM IMS BOAT MODEL

MO- DEL	Fn .125	.150	.175	.200	.225	.250	.275	.300	.325
01	0.20	0.37	0.61	0.90	1.32	1.92	2.70	3.56	4.66
02	0.19	0.36	0.58	0.84	1.22	1.78	2.51	3.31	4.34
03	0.21	0.39	0.64	0.97	1.43	2.09	2.92	3.84	5.01
04	0.20	0.37	0.60	0.90	1.31	1.92	2.70	3.54	4.62
05	0.20	0.37	0.60	0.90	1.32	1.91	2.68	3.55	4.69
06	0.19	0.36	0.57	0.84	1.22	1.76	2.48	3.30	4.37
07	0.21	0.38	0.63	0.95	1.40	2.04	2.87	3.76	4.88
08	0.20	0.37	0.60	0.89	1.30	1.90	2.67	3.52	4.61
09	0.20	0.38	0.61	0.91	1.33	1.94	2.73	3.59	4.70
10	0.20	0.37	0.61	0.90	1.32	1.92	2.70	3.56	4.66
11	0.20	0.37	0.61	0.90	1.32	1.92	2.70	3.56	4.66
12	0.20	0.37	0.60	0.90	1.31	1.92	2.70	3.54	4.62
13	0.20	0.37	0.60	0.90	1.31	1.92	2.70	3.54	4.62
14	0.20	0.37	0.60	0.88	1.29	1.88	2.65	3.48	4.54
15	0.20	0.37	0.60	0.88	1.29	1.87	2.64	3.48	4.56
16	0.19	0.36	0.57	0.83	1.19	1.73	2.44	3.25	4.31
17	0.20	0.38	0.61	0.92	1.34	1.95	2.74	3.61	4.72
18	0.20	0.38	0.61	0.92	1.34	1.95	2.74	3.61	4.72
19	0.20	0.37	0.60	0.89	1.30	1.89	2.66	3.50	4.59
20	0.20	0.37	0.60	0.89	1.30	1.89	2.66	3.50	4.59
21	0.20	0.38	0.61	0.91	1.33	1.95	2.74	3.60	4.69
22	0.20	0.38	0.61	0.92	1.34	1.95	2.73	3.62	4.77
23	0.20	0.37	0.60	0.89	1.30	1.90	2.68	3.52	4.60
24	0.22	0.42	0.73	1.17	1.77	2.53	3.48	4.64	6.18
25	0.21	0.39	0.64	0.97	1.43	2.09	2.93	3.84	5.00
26	0.23	0.42	0.74	1.24	1.88	2.61	3.53	4.86	6.79
27	0.19	0.35	0.55	0.80	1.14	1.67	2.38	3.13	4.10
28	0.21	0.40	0.66	1.04	1.54	2.20	3.04	4.09	5.51

Table 6b

RESIDUAL RESISTANCE DATA
FROM IMS BOAT MODEL

MO-DEL	Fn .350	.375	.400	.425	.450	.475	.500	.525	.535
01	6.96	11.52	19.05	30.03	44.43	61.34	79.96	100.09	108.97
02	6.57	11.05	18.49	29.40	43.72	60.55	79.09	99.15	108.00
03	7.38	12.03	19.63	30.66	45.07	61.97	80.57	100.70	109.57
04	6.92	11.55	18.88	28.94	41.53	56.20	72.55	90.50	98.48
05	6.96	11.40	19.07	31.05	47.46	66.93	88.20	110.99	120.98
06	6.58	10.92	18.51	30.48	46.94	66.53	87.92	110.86	120.91
07	7.25	11.94	19.30	29.27	41.65	56.05	72.14	89.83	97.72
08	6.90	11.45	18.97	29.93	44.29	61.16	79.73	99.83	108.69
09	7.01	11.58	19.11	30.07	44.40	61.23	79.75	99.80	108.65
10	6.96	11.51	19.05	30.09	44.60	61.65	80.40	100.67	109.61
11	6.96	11.51	19.05	30.09	44.60	61.65	80.40	100.67	109.61
12	6.92	11.54	18.90	29.02	41.74	56.58	73.09	91.19	99.24
13	6.92	11.54	18.90	29.02	41.74	56.58	73.09	91.19	99.24
14	6.83	11.43	18.76	28.87	41.58	56.40	72.90	90.98	99.02
15	6.84	11.36	18.88	29.94	44.51	61.65	80.49	100.85	109.82
16	6.49	10.82	18.39	30.33	46.76	66.32	87.68	110.59	120.63
17	7.03	11.60	19.15	30.20	44.71	61.75	80.49	100.75	109.68
18	7.03	11.60	19.15	30.20	44.71	61.75	80.49	100.75	109.68
19	6.87	11.41	18.93	29.94	44.41	61.42	80.13	100.37	109.29
20	6.87	11.41	18.93	29.94	44.41	61.42	80.13	100.37	109.29
21	7.01	11.64	19.01	29.16	41.92	56.80	73.36	91.50	99.56
22	7.07	11.52	19.22	31.31	47.92	67.65	89.19	112.24	122.34
23	6.89	11.49	18.90	29.30	42.56	58.06	75.24	93.98	102.28
24	8.68	12.66	17.56	22.28	26.59	31.67	38.60	47.63	52.03
25	7.39	11.98	18.47	25.88	33.85	43.00	53.93	66.80	72.75
26	9.20	11.93	14.66	17.02	19.14	21.97	26.37	32.54	35.64
27	6.28	10.74	18.01	28.26	41.35	56.66	73.65	92.20	100.42
28	7.87	11.73	16.53	21.16	25.37	30.32	37.07	45.84	50.12

Table 7

IMS PARAMETERS FOR THE MODELS OF
SYSTEMATIC DELFT SERIES

MODEL	LSM1	B	T	Aw	DISPL	LCB	Cp	L
01	9.909	3.113	0.860	20.196	9.900	0.15	0.511	9.922
02	9.903	2.740	0.932	17.976	9.864	0.17	0.517	9.888
03	9.876	3.586	0.768	23.220	9.842	0.16	0.519	9.960
04	9.928	2.798	0.833	18.213	8.241	0.14	0.486	9.982
05	9.930	3.604	0.936	23.590	12.774	0.19	0.513	9.906
06	9.927	3.136	1.005	21.036	12.939	0.19	0.530	9.852
07	9.809	3.078	0.743	20.366	8.044	0.09	0.501	9.908
08	10.047	3.043	0.847	21.014	9.856	0.18	0.522	10.069
09	9.762	3.170	0.864	20.497	9.868	0.12	0.506	9.752
10	9.898	3.126	0.855	20.140	9.878	-0.06	0.511	9.918
11	9.953	3.104	0.865	20.272	9.889	0.40	0.512	9.952
12	9.884	2.789	0.814	17.921	8.223	-0.07	0.501	9.954
13	9.941	2.768	0.825	18.040	8.218	0.38	0.502	9.981
14	9.652	2.772	0.848	17.230	8.229	0.15	0.488	9.781
15	9.666	3.100	0.897	19.323	9.988	0.16	0.497	9.746
16	9.714	3.147	1.050	19.739	12.942	0.17	0.506	9.677
17	10.146	3.129	0.826	20.942	9.854	-0.07	0.525	10.097
18	10.205	3.110	0.836	21.131	9.887	0.39	0.525	10.128
19	9.667	3.115	0.885	19.294	9.869	-0.05	0.497	9.767
20	9.712	3.089	0.897	19.376	9.881	0.41	0.497	9.787
21	10.147	2.787	0.794	18.743	8.255	0.13	0.511	10.117
22	10.179	3.632	0.902	24.573	12.955	0.16	0.538	10.069
23	9.942	2.884	0.826	18.163	8.340	0.100	0.507	10.083
24	9.788	2.808	0.418	15.317	3.342	0.000	0.431	10.155
25	9.875	2.487	0.632	15.104	4.969	0.050	0.468	10.122
26	9.743	2.434	0.351	12.081	2.324	-0.050	0.382	10.150
27	9.956	2.244	0.973	14.317	8.254	0.090	0.506	10.019
28	9.824	2.180	0.509	12.596	3.266	0.000	0.424	10.132

Table 8a

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (ITC COEFFICIENTS)

MODEL	A0	A1	A2	A3	A4
01	1.0000	0.5110	1.5138	3.6198	4.6148
02	1.0000	0.5170	1.7167	2.9399	4.6176
03	1.0000	0.5190	1.6201	4.6693	4.6084
04	1.0000	0.4860	1.4102	3.3589	4.9151
05	1.0000	0.5130	1.9134	3.8504	4.2479
06	1.0000	0.5300	1.9140	3.1204	4.2285
07	1.0000	0.5010	0.9175	4.1427	4.8955
08	1.0000	0.5220	1.7916	3.5927	4.6860
09	1.0000	0.5060	1.2293	3.6690	4.5512
10	1.0000	0.5110	-0.6062	3.6561	4.6131
11	1.0000	0.5120	4.0189	3.5884	4.6370
12	1.0000	0.5010	-0.7082	3.4263	4.8969
13	1.0000	0.5020	3.8226	3.3552	4.9262
14	1.0000	0.4880	1.5541	3.2689	4.7808
15	1.0000	0.4970	1.6553	3.4560	4.4884
16	1.0000	0.5060	1.7501	2.9971	4.1374
17	1.0000	0.5250	-0.6899	3.7881	4.7325
18	1.0000	0.5250	3.8217	3.7201	4.7547
19	1.0000	0.4970	-0.5172	3.5198	4.5068
20	1.0000	0.4970	4.2216	3.4437	4.5259
21	1.0000	0.5110	1.2812	3.5101	5.0207
22	1.0000	0.5380	1.5719	4.0266	4.3340
23	1.0000	0.5070	1.0058	3.4915	4.9025
24	1.0000	0.4310	0.0000	6.7177	6.5467
25	1.0000	0.4680	0.5063	3.9351	5.7869
26	1.0000	0.3820	-0.5132	6.9345	7.3555
27	1.0000	0.5060	0.9040	2.3063	4.9264
28	1.0000	0.4240	0.0000	4.2829	6.6214

Table 8b

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (ITC COEFFICIENTS)

MODEL	A5	A6	A7	A8	A9
01	0.2611	2.3582	2.2915	21.2962	98.2775
02	0.2673	2.3873	2.9469	21.3222	98.4572
03	0.2694	2.3918	2.6247	21.2377	97.8723
04	0.2362	2.3888	1.9885	24.1585	118.7423
05	0.2632	2.1792	3.6611	18.0446	76.6515
06	0.2809	2.2411	3.6633	17.8801	75.6055
07	0.2510	2.4527	0.8419	23.9663	117.3281
08	0.2725	2.4461	3.2098	21.9587	102.8984
09	0.2560	2.3029	1.5111	20.7137	94.2730
10	0.2611	2.3573	0.3675	21.2805	98.1688
11	0.2621	2.3741	16.1515	21.5017	99.7033
12	0.2510	2.4534	0.5016	23.9798	117.4270
13	0.2520	2.4729	14.6119	24.2670	119.5430
14	0.2381	2.3330	2.4152	22.8562	109.2710
15	0.2470	2.2307	2.7400	20.1453	90.4194
16	0.2560	2.0935	3.0627	17.1184	70.8260
17	0.2756	2.4846	0.4760	22.3966	105.9917
18	0.2756	2.4962	14.6051	22.6073	107.4916
19	0.2470	2.2399	0.2675	20.3112	91.5381
20	0.2470	2.2494	17.8218	20.4841	92.7097
21	0.2611	2.5656	1.6414	25.2075	126.5598
22	0.2894	2.3317	2.4708	18.7839	81.4100
23	0.2570	2.4856	1.0117	24.0346	117.8298
24	0.1858	2.8216	0.0000	42.8598	280.5921
25	0.2190	2.7083	0.2564	33.4884	193.7949
26	0.1459	2.8098	0.2634	54.1038	397.9623
27	0.2560	2.4928	0.8172	24.2695	119.5612
28	0.1798	2.8075	0.0000	43.8429	290.3012

Table 8c

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (ITC COEFFICIENTS)

MODEL	B0	B1	B2	B3	B4
23	1.0000	3.4473	4.4165	11.8838	296.9677
24	1.0000	3.4858	6.8523	12.1505	1121.5150
25	1.0000	3.9706	5.1870	15.7660	554.1142
26	1.0000	4.0029	6.8857	16.0230	1306.7982
27	1.0000	4.4367	3.5054	19.6845	191.1125
28	1.0000	4.5064	5.7221	20.3078	844.3013

Table 9a

POLYNOMINAL COEFFICIENTS
ITC

	Fn .125	Fn .150	Fn .175	Fn .200	Fn .225
A0	-49.7767	-49.5033	-22.1499	5.8311	64.5373
A1	144.5325	138.4008	38.2289	-72.0207	-244.7179
A2	0.0085	-0.0015	-0.0144	-0.0310	-0.0778
A3	0.0839	0.0848	0.1192	0.1546	0.2488
A4	5.2363	4.6347	3.7618	4.9810	-1.0260
A5	-98.5334	-72.9594	15.2440	100.1172	219.1865
A6	-10.1182	-14.5491	-12.6754	-7.6593	3.5497
A7	-0.0030	-0.0014	0.0010	0.0054	0.0173
A8	0.1991	0.9229	1.0041	0.2557	0.1518
A9	-0.0313	-0.0910	-0.1035	-0.0542	-0.0334

	Fn .250	Fn .275	Fn .300	Fn .325	Fn .350
A0	106.0372	212.6402	439.2131	757.6647	1410.0875
A1	-395.5290	-725.1686	-1479.8467	-2464.2500	-4365.8789
A2	-0.1410	-0.1941	-0.3159	-0.5575	-0.9797
A3	0.3148	0.4368	0.6227	0.8276	0.9170
A4	-2.0188	-14.0042	-32.0520	-61.5461	-134.5768
A5	338.1124	608.4379	1242.7170	1987.7618	3421.8015
A6	10.7559	24.1062	50.1291	100.3513	190.7332
A7	0.0346	0.0506	0.0897	0.1373	0.2127
A8	-0.3700	0.6251	1.7137	2.0033	6.3188
A9	0.0031	-0.0554	-0.1307	-0.1065	-0.3167

	Fn .375	Fn .400	Fn .425	Fn .450
A0	1536.7095	1874.8409	1344.3876	2556.0984
A1	-4549.0454	-5189.0415	-3267.4482	-6607.0762
A2	-1.4449	-1.7490	-2.0148	-2.5633
A3	0.7172	0.0543	-0.6174	-0.5039
A4	-153.8753	-213.0733	-162.1635	-293.5796
A5	3369.8752	3573.3340	1748.9366	4031.5061
A6	230.7699	312.6148	288.2621	497.9645
A7	0.2895	0.3375	0.4070	0.5911
A8	4.4122	4.9680	-5.0848	-5.2661
A9	-0.0932	0.0644	0.8491	1.1653

Table 9b

POLYNOMINAL COEFFICIENTS
ITC

	Fn .450	.475	.500	.525	.550
B0	87.0266	144.4916	261.3271	289.7552	354.9536
B1	-1.8913	-11.6889	-38.3826	-38.9641	-56.4088
B2	-6.3338	-10.4535	-20.1075	-22.3385	-26.0677
B3	-0.5285	0.2255	2.6668	2.2715	3.9805
B4	0.0076	0.0122	0.0307	0.0318	0.0381

	Fn .575	.600
B0	372.9125	374.2655
B1	-56.8618	-50.6484
B2	-27.5113	-28.4655
B3	3.7745	2.7908
B4	0.0400	0.0409

Table 10

STANDARD DEVIATION OF RESIDUALS FOR
ITC POLYNOMINAL LOW SPEED RANGE

Fn						
.125	.150	.175	.200	.225	.250	.275
0.05110	0.06826	0.08769	0.12332	0.15625	0.19348	0.25029

Fn						
.300	.325	.350	.375	.400	.425	.450
0.35574	0.39771	0.41529	0.43994	0.80110	1.18938	1.76253

ITC POLYNOMINAL HIGH SPEED RANGE

Fn						
.450	.475	.500	.525	.550	.575	.600
0.53978	0.36773	0.09685	0.49992	0.88443	1.19828	1.07811

Table 11a

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (Cp and VOL of canue)

MODEL	A0	A1	A2	A3	A4
01	1.0000	0.5680	1.5138	3.6198	4.7334
02	1.0000	0.5690	1.7167	2.9399	4.7311
03	1.0000	0.5650	1.6201	4.6693	4.7208
04	1.0000	0.5640	1.4102	3.3589	5.0630
05	1.0000	0.5740	1.9134	3.8504	4.3271
06	1.0000	0.5680	1.9140	3.1204	4.3056
07	1.0000	0.5620	0.9175	4.1427	5.0464
08	1.0000	0.5850	1.7916	3.5927	4.8015
09	1.0000	0.5460	1.2293	3.6690	4.6619
10	1.0000	0.5650	-0.6062	3.6561	4.7265
11	1.0000	0.5650	4.0189	3.5884	4.7526
12	1.0000	0.5650	-0.7082	3.4263	5.0436
13	1.0000	0.5650	3.8226	3.3552	5.0734
14	1.0000	0.5300	1.5541	3.2689	4.9244
15	1.0000	0.5300	1.6553	3.4560	4.5987
16	1.0000	0.5300	1.7501	2.9971	4.2144
17	1.0000	0.6000	-0.6899	3.7881	4.8484
18	1.0000	0.6000	3.8217	3.7201	4.8729
19	1.0000	0.5300	-0.5172	3.5198	4.6170
20	1.0000	0.5300	4.2216	3.4437	4.6387
21	1.0000	0.6000	1.2812	3.5101	5.1717
22	1.0000	0.6000	1.5719	4.0266	4.4135
23	1.0000	0.5480	1.0058	3.4915	4.9745
24	1.0000	0.5480	0.0000	6.7177	6.7942
25	1.0000	0.5480	0.5063	3.9351	5.9270
26	1.0000	0.5450	-0.5132	6.9345	7.7773
27	1.0000	0.5480	0.9040	2.3063	4.9966
28	1.0000	0.5460	0.0000	4.2829	6.8779

Table 11b

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (Cp and VOL of canue)

MODEL	A5	A6	A7	A8	A9
01	0.3226	2.6886	2.2915	22.4055	106.0549
02	0.3238	2.6920	2.9469	22.3832	105.8970
03	0.3192	2.6672	2.6247	22.2856	105.2053
04	0.3181	2.8555	1.9885	25.6336	129.7818
05	0.3295	2.4838	3.6611	18.7241	81.0217
06	0.3226	2.4456	3.6633	18.5383	79.8188
07	0.3158	2.8361	0.8419	25.4660	128.5114
08	0.3422	2.8089	3.2098	23.0540	110.6927
09	0.2981	2.5454	1.5111	21.7330	101.3163
10	0.3192	2.6705	0.3675	22.3395	105.5870
11	0.3192	2.6852	16.1515	22.5868	107.3453
12	0.3192	2.8497	0.5016	25.4384	128.3022
13	0.3192	2.8665	14.6119	25.7395	130.5868
14	0.2809	2.6099	2.4152	24.2496	119.4145
15	0.2809	2.4373	2.7400	21.1483	97.2549
16	0.2809	2.2336	3.0627	17.7610	74.8514
17	0.3600	2.9090	0.4760	23.5071	113.9724
18	0.3600	2.9237	14.6051	23.7451	115.7071
19	0.2809	2.4470	0.2675	21.3167	98.4192
20	0.2809	2.4585	17.8218	21.5172	99.8109
21	0.3600	3.1030	1.6414	26.7462	138.3227
22	0.3600	2.6481	2.4708	19.4787	85.9689
23	0.3003	2.7260	1.0117	24.7459	123.0992
24	0.3003	3.7232	0.0000	46.1609	313.6250
25	0.3003	3.2480	0.2564	35.1290	208.2090
26	0.2970	4.2387	0.2634	60.4871	470.4295
27	0.3003	2.7381	0.8172	24.9660	124.7450
28	0.2981	3.7554	0.0000	47.3061	325.3685

Table 12

POLYNOMINAL COEFFICIENTS
ITC (Cp and VOL of canue)

	Fn .125	.150	.175	.200	.225
A0	-8.0377	-5.0964	-4.0063	-0.2174	13.9509
A1	42.6102	43.0532	35.9176	15.2289	-13.9515
A2	0.0061	-0.0012	-0.0119	-0.0259	-0.0696
A3	0.0824	0.0800	0.1107	0.1445	0.2369
A4	-1.9979	-3.5562	-2.7782	-0.9845	-3.5007
A5	-43.9270	-45.8841	-45.8740	-40.3708	-35.0773
A6	1.2901	1.6457	3.0668	6.1498	11.1784
A7	-0.0024	-0.0016	0.0002	0.0039	0.0148
A8	0.2452	0.4910	0.2173	-0.4380	-0.4909
A9	-0.0158	-0.0299	-0.0139	0.0263	0.0299

	Fn .250	.275	.300	.325	.350
A0	15.0664	27.2217	36.3044	83.2797	203.7388
A1	-30.1077	-60.1994	-143.3011	-362.8801	-755.5934
A2	-0.1292	-0.1754	-0.2832	-0.5077	-0.9060
A3	0.2953	0.3928	0.5293	0.7018	0.7966
A4	-1.4279	-3.5312	3.3124	11.0976	9.7098
A5	-28.9395	-10.6354	70.3875	269.2261	584.6620
A6	13.6054	16.6803	16.7411	16.8409	22.3479
A7	0.0310	0.0449	0.0801	0.1232	0.1930
A8	-1.0979	-1.0197	-2.2392	-3.6137	-3.8962
A9	0.0655	0.0605	0.1304	0.2083	0.2216

	Fn .375	.400	.425	.450
A0	309.1888	509.2499	610.6916	980.6454
A1	-978.9999	-1402.2388	-1241.6066	-1973.4962
A2	-1.3842	-1.6881	-2.0013	-2.5180
A3	0.7324	0.2652	-0.2052	0.0221
A4	-2.1619	-30.2643	-82.7745	-136.2865
A5	700.5231	955.8285	533.6097	803.7515
A6	35.4150	56.0934	116.5916	202.5933
A7	0.2747	0.3241	0.4065	0.5837
A8	-3.2834	-0.5015	1.9898	1.4279
A9	0.1922	0.0364	-0.0740	0.0136

Table 13

STANDARD DEVIATION OF RESIDUALS FOR
ITC POLYNOMINAL LOW SPEED RANGE (Cp and VOL of canue)

			Fn			
.125	.150	.175	.200	.225	.250	.275
0.05413	0.07446	0.09911	0.13272	0.15416	0.17910	0.21291

			Fn			
.300	.325	.350	.375	.400	.425	.450
0.29267	0.29742	0.42633	0.50066	0.58897	0.92876	1.52418

Table 14a

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (Cwl and Cp)

MODEL	A0	A1	A2	A3	A4
01	1.0000	0.6547	1.5138	3.6198	4.6148
02	1.0000	0.6625	1.7167	2.9399	4.6176
03	1.0000	0.6556	1.6201	4.6693	4.6084
04	1.0000	0.6556	1.4102	3.3589	4.9151
05	1.0000	0.6592	1.9134	3.8504	4.2479
06	1.0000	0.6757	1.9140	3.1204	4.2285
07	1.0000	0.6745	0.9175	4.1427	4.8955
08	1.0000	0.6873	1.7916	3.5927	4.6860
09	1.0000	0.6624	1.2293	3.6690	4.5512
10	1.0000	0.6509	-0.6062	3.6561	4.6131
11	1.0000	0.6562	4.0189	3.5884	4.6370
12	1.0000	0.6501	-0.7082	3.4263	4.8969
13	1.0000	0.6556	3.8226	3.3552	4.9262
14	1.0000	0.6440	1.5541	3.2689	4.7808
15	1.0000	0.6449	1.6553	3.4560	4.4884
16	1.0000	0.6457	1.7501	2.9971	4.1374
17	1.0000	0.6597	-0.6899	3.7881	4.7325
18	1.0000	0.6658	3.8217	3.7201	4.7547
19	1.0000	0.6407	-0.5172	3.5198	4.5068
20	1.0000	0.6459	4.2216	3.4437	4.5259
21	1.0000	0.6628	1.2812	3.5101	5.0207
22	1.0000	0.6647	1.5719	4.0266	4.3340
23	1.0000	0.6335	1.0058	3.4915	4.9025
24	1.0000	0.5573	0.0000	6.7177	6.5467
25	1.0000	0.6150	0.5063	3.9351	5.7869
26	1.0000	0.5094	-0.5132	6.9345	7.3555
27	1.0000	0.6408	0.9040	2.3063	4.9264
28	1.0000	0.5881	0.0000	4.2829	6.6214

Table 14b

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (Cwl and Cp)

MODEL	A5	A6	A7	A8	A9
01	0.4287	2.3582	2.2915	21.2962	98.2775
02	0.4389	2.3873	2.9469	21.3222	98.4572
03	0.4299	2.3918	2.6247	21.2377	97.8723
04	0.4299	2.3888	1.9885	24.1585	118.7423
05	0.4345	2.1792	3.6611	18.0446	76.6515
06	0.4566	2.2411	3.6633	17.8801	75.6055
07	0.4550	2.4527	0.8419	23.9663	117.3281
08	0.4724	2.4461	3.2098	21.9587	102.8984
09	0.4387	2.3029	1.5111	20.7137	94.2730
10	0.4237	2.3573	0.3675	21.2805	98.1688
11	0.4306	2.3741	16.1515	21.5017	99.7033
12	0.4226	2.4534	0.5016	23.9798	117.4270
13	0.4298	2.4729	14.6119	24.2670	119.5430
14	0.4147	2.3330	2.4152	22.8562	109.2710
15	0.4158	2.2307	2.7400	20.1453	90.4194
16	0.4169	2.0935	3.0627	17.1184	70.8260
17	0.4351	2.4846	0.4760	22.3966	105.9917
18	0.4433	2.4962	14.6051	22.6073	107.4916
19	0.4105	2.2399	0.2675	20.3112	91.5381
20	0.4171	2.2494	17.8218	20.4841	92.7097
21	0.4393	2.5656	1.6414	25.2075	126.5598
22	0.4418	2.3317	2.4708	18.7839	81.4100
23	0.4013	2.4856	1.0117	24.0346	117.8298
24	0.3106	2.8216	0.0000	42.8598	280.5921
25	0.3782	2.7083	0.2564	33.4884	193.7949
26	0.2595	2.8098	0.2634	54.1038	397.9623
27	0.4107	2.4928	0.8172	24.2695	119.5612
28	0.3459	2.8075	0.0000	43.8429	290.3012

Table 15

POLYNOMINAL COEFFICIENTS
ITC (Cwl and Cp)

	Fn .125	.150	.175	.200	.225
A0	26.7830	12.8491	9.6177	3.3336	17.7682
A1	-54.0677	-16.0624	-16.7614	-21.5402	-58.2029
A2	-0.0181	-0.0287	-0.0520	-0.0843	-0.1484
A3	0.0614	0.0907	0.1282	0.1662	0.2391
A4	-5.8754	-4.9481	-3.1238	1.2244	-0.6308
A5	44.7189	16.9364	19.1938	25.0294	54.5403
A6	-1.1475	-1.4588	-2.0718	-2.5424	-2.6773
A7	0.0028	0.0041	0.0087	0.0167	0.0330
A8	1.3167	1.1265	0.8666	0.0877	0.5048
A9	-0.0906	-0.0752	-0.0612	-0.0132	-0.0428

	Fn .250	.275	.300	.325	.350
A0	6.4944	-9.6827	-51.3043	-61.9385	-40.8812
A1	-51.3766	-15.2471	44.1826	34.3256	-4.8906
A2	-0.2209	-0.2878	-0.4318	-0.7028	-1.1219
A3	0.3121	0.4614	0.6876	0.8805	0.8988
A4	4.0009	5.4703	16.4481	23.5244	23.3580
A5	50.8013	26.0395	-14.3877	-3.6838	22.7709
A6	-2.0995	-0.8767	1.0474	2.1722	-1.8335
A7	0.0524	0.0712	0.1149	0.1703	0.2479
A8	-0.4296	-0.8955	-3.2722	-4.7239	-4.1232
A9	0.0177	0.0554	0.2165	0.3091	0.2447

	Fn .375	.400	.425	.450
A0	46.9423	165.5194	307.7949	393.4954
A1	-158.1663	-308.8759	-532.8826	-671.5203
A2	-1.5326	-1.6916	-1.9436	-2.5265
A3	0.5515	-0.3162	-1.1211	-1.1624
A4	14.3851	-6.7749	-25.8149	-23.5836
A5	124.4368	207.9914	367.2076	466.7444
A6	-10.4361	-17.0840	-26.5502	-34.7940
A7	0.3165	0.3385	0.4084	0.6081
A8	-1.3004	3.6597	8.0755	7.4735
A9	0.0131	-0.3521	-0.6761	-0.6583

Table 16

STANDARD DEVIATION OF RESIDUALS FOR
ITC POLYNOMINAL LOW SPEED RANGE (Cwl and Cp)

Fn						
.125	.150	.175	.200	.225	.250	.275
0.02953	0.04358	0.04599	0.06538	0.09752	0.13494	0.18408

Fn						
.300	.325	.350	.375	.400	.425	.450
0.29061	0.35800	0.53779	0.61603	0.87424	1.17519	1.85729

Table 17a

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (no Cp)

MODEL	A0	A1	A2	A3	A4
01	1.0000	1.5138	3.6198	4.6148	2.2915
02	1.0000	1.7167	2.9399	4.6176	2.9469
03	1.0000	1.6201	4.6693	4.6084	2.6247
04	1.0000	1.4102	3.3589	4.9151	1.9885
05	1.0000	1.9134	3.8504	4.2479	3.6611
06	1.0000	1.9140	3.1204	4.2285	3.6633
07	1.0000	0.9175	4.1427	4.8955	0.8419
08	1.0000	1.7916	3.5927	4.6860	3.2098
09	1.0000	1.2293	3.6690	4.5512	1.5111
10	1.0000	-0.6062	3.6561	4.6131	0.3675
11	1.0000	4.0189	3.5884	4.6370	16.1515
12	1.0000	-0.7082	3.4263	4.8969	0.5016
13	1.0000	3.8226	3.3552	4.9262	14.6119
14	1.0000	1.5541	3.2689	4.7808	2.4152
15	1.0000	1.6553	3.4560	4.4884	2.7400
16	1.0000	1.7501	2.9971	4.1374	3.0627
17	1.0000	-0.6899	3.7881	4.7325	0.4760
18	1.0000	3.8217	3.7201	4.7547	14.6051
19	1.0000	-0.5172	3.5198	4.5068	0.2675
20	1.0000	4.2216	3.4437	4.5259	17.8218
21	1.0000	1.2812	3.5101	5.0207	1.6414
22	1.0000	1.5719	4.0266	4.3340	2.4708
23	1.0000	1.0058	3.4915	4.9025	1.0117
24	1.0000	0.0000	6.7177	6.5467	0.0000
25	1.0000	0.5063	3.9351	5.7869	0.2564
26	1.0000	-0.5132	6.9345	7.3555	0.2634
27	1.0000	0.9040	2.3063	4.9264	0.8172
28	1.0000	0.0000	4.2829	6.6214	0.0000

Table 17b

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (no Cp)

MODEL	A5	A6
01	21.2962	98.2775
02	21.3222	98.4572
03	21.2377	97.8723
04	24.1585	118.7423
05	18.0446	76.6515
06	17.8801	75.6055
07	23.9663	117.3281
08	21.9587	102.8984
09	20.7137	94.2730
10	21.2805	98.1688
11	21.5017	99.7033
12	23.9798	117.4270
13	24.2670	119.5430
14	22.8562	109.2710
15	20.1453	90.4194
16	17.1184	70.8260
17	22.3966	105.9917
18	22.6073	107.4916
19	20.3112	91.5381
20	20.4841	92.7097
21	25.2075	126.5598
22	18.7839	81.4100
23	24.0346	117.8298
24	42.8598	280.5921
25	33.4884	193.7949
26	54.1038	397.9623
27	24.2695	119.5612
28	43.8429	290.3012

Table 18

POLYNOMINAL COEFFICIENTS
ITC (no Cp)

	Fn .125	Fn .150	Fn .175	Fn .200	Fn .225
A0	2.9480	5.6354	2.2342	-6.7167	-9.3499
A1	0.0086	0.0010	-0.0123	-0.0301	-0.0793
A2	0.0746	0.0719	0.0975	0.1289	0.2232
A3	-1.8621	-3.3215	-1.3868	3.8883	5.3204
A4	-0.0033	-0.0024	0.0000	0.0048	0.0176
A5	0.3707	0.6427	0.2909	-0.7099	-0.9529
A6	-0.0246	-0.0408	-0.0194	0.0428	0.0561

	Fn .250	Fn .275	Fn .300	Fn .325	Fn .350
A0	-20.0944	-25.3284	-48.9740	-69.0609	-53.2095
A1	-0.1393	-0.1848	-0.2917	-0.5335	-0.9905
A2	0.3018	0.4487	0.6690	0.8883	0.8590
A3	11.3801	14.1759	27.3810	39.0452	32.6727
A4	0.0344	0.0488	0.0849	0.1339	0.2194
A5	-2.0387	-2.4851	-4.8473	-6.9562	-5.8980
A6	0.1197	0.1417	0.2779	0.4007	0.3415

	Fn .375	Fn .400	Fn .425	Fn .450
A0	-1.1358	90.5045	165.0625	213.7468
A1	-1.5316	-1.9306	-2.2822	-2.9298
A2	0.4594	-0.4181	-1.2457	-1.3464
A3	10.1943	-31.5938	-58.4201	-64.3821
A4	0.3153	0.3881	0.4780	0.6908
A5	-2.2487	4.9567	8.9582	8.3815
A6	0.1468	-0.2604	-0.4637	-0.3748

Table 19

STANDARD DEVIATION OF RESIDUALS FOR
ITC POLYNOMINAL LOW SPEED RANGE (no Cp)

Fn						
.125	.150	.175	.200	.225	.250	.275
0.06099	0.08132	0.10681	0.13994	0.16769	0.19951	0.27422

Fn						
.300	.325	.350	.375	.400	.425	.450
0.44773	0.55572	0.59762	0.79126	1.46365	2.13881	2.92916

Table 20

MATRIX OF PARAMETERS FOR
LINEAR EQUATIONS (BTR and L/(VOL^1/3))

MO-DEL	A0	A1	A2	A3	A4	A5
01	1.0000	3.6198	4.6148	16.7044	13.1027	21.2962
02	1.0000	2.9399	4.6176	13.5753	8.6431	21.3222
03	1.0000	4.6693	4.6084	21.5180	21.8021	21.2377
04	1.0000	3.3589	4.9151	16.5096	11.2825	24.1585
05	1.0000	3.8504	4.2479	16.3562	14.8258	18.0446
06	1.0000	3.1204	4.2285	13.1945	9.7369	17.8801
07	1.0000	4.1427	4.8955	20.2806	17.1617	23.9663
08	1.0000	3.5927	4.6860	16.8353	12.9073	21.9587
09	1.0000	3.6690	4.5512	16.6984	13.4614	20.7137
10	1.0000	3.6561	4.6131	16.8661	13.3674	21.2805
11	1.0000	3.5884	4.6370	16.6396	12.8769	21.5017
12	1.0000	3.4263	4.8969	16.7783	11.7395	23.9798
13	1.0000	3.3552	4.9262	16.5280	11.2570	24.2670
14	1.0000	3.2689	4.7808	15.6278	10.6855	22.8562
15	1.0000	3.4560	4.4884	15.5116	11.9437	20.1453
16	1.0000	2.9971	4.1374	12.4005	8.9829	17.1184
17	1.0000	3.7881	4.7325	17.9274	14.3500	22.3966
18	1.0000	3.7201	4.7547	17.6880	13.8391	22.6073
19	1.0000	3.5198	4.5068	15.8629	12.3888	20.3112
20	1.0000	3.4437	4.5259	15.5860	11.8591	20.4841
21	1.0000	3.5101	5.0207	17.6231	12.3206	25.2075
22	1.0000	4.0266	4.3340	17.4515	16.2136	18.7839
23	1.0000	3.4915	4.9025	17.1172	12.1908	24.0346
24	1.0000	6.7177	6.5467	43.9791	45.1275	42.8598
25	1.0000	3.9351	5.7869	22.7723	15.4852	33.4884
26	1.0000	6.9345	7.3555	51.0067	48.0869	54.1038
27	1.0000	2.3063	4.9264	11.3616	5.3189	24.2695
28	1.0000	4.2829	6.6214	28.3588	18.3433	43.8429

Table 21

POLYNOMINAL COEFFICIENTS
ITC (BTR and L/(VOL^1/3))

	Fn .125	Fn .150	Fn .175	Fn .200	Fn .225
A0	-1.2031	-1.0607	-1.1553	-0.3049	-1.4165
A1	0.0069	0.2237	0.2122	0.0212	-0.1887
A2	0.4881	0.2800	0.3432	0.2314	0.9068
A3	0.0113	-0.0294	0.0528	0.2359	0.4025
A4	0.0006	0.0010	-0.0465	-0.1362	-0.2057
A5	-0.0547	-0.0149	-0.0469	-0.1041	-0.2298

	Fn .250	Fn .275	Fn .300	Fn .325	Fn .350
A0	-2.1399	-3.9950	-5.8827	-7.4748	-4.4456
A1	-0.2638	0.0341	0.2456	0.0053	-0.7554
A2	1.3874	2.1018	2.9987	4.2423	4.7508
A3	0.5509	0.6435	0.9481	1.3207	1.6408
A4	-0.2810	-0.3565	-0.5469	-0.7268	-0.8404
A5	-0.3283	-0.4328	-0.6411	-0.9042	-1.0797

	Fn .375	Fn .400	Fn .425	Fn .450
A0	12.1066	33.5080	69.0754	123.2609
A1	-2.7222	-5.3420	-9.4380	-14.2391
A2	2.4321	0.4634	-3.1416	-10.3076
A3	1.6687	1.5657	2.5230	4.7760
A4	-0.6723	-0.4026	-0.6258	-1.4985
A5	-0.9086	-0.7158	-0.9151	-1.5064

Table 22

STANDARD DEVIATION OF RESIDUALS FOR
ITC POLYNOMINAL LOW SPEED RANGE (BTR and L/DISPL^(1/3))

Fn						
.125	.150	.175	.200	.225	.250	.275
0.06370	0.08527	0.10427	0.12557	0.14404	0.18420	0.25866

Fn						
.300	.325	.350	.375	.400	.425	.450
0.45307	0.60917	0.77461	1.14888	1.78854	2.38316	3.10494

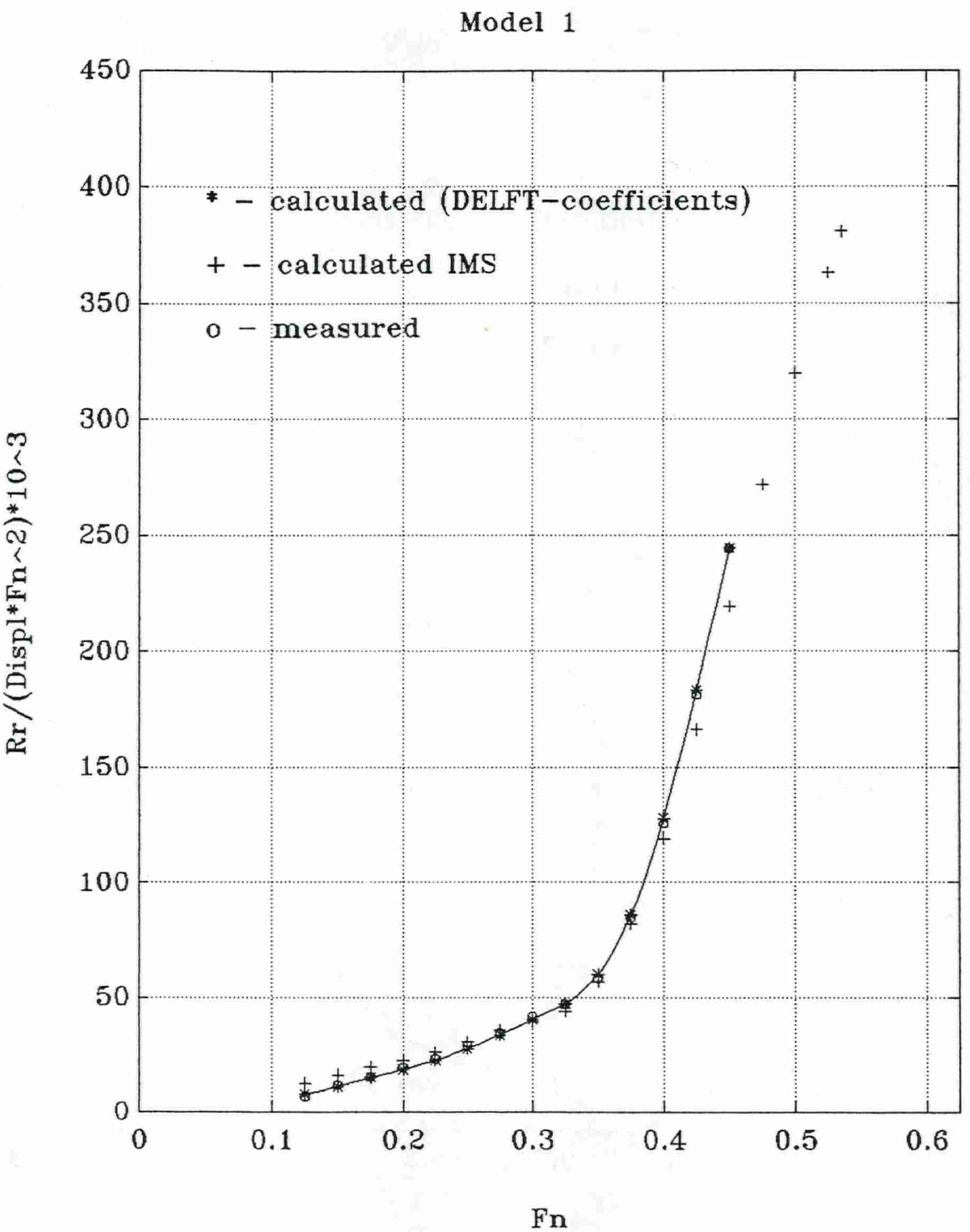
Table 23

STANDARD DEVIATION OF RESIDUALS
OF ALL MODEL AND ALL SPEEDS UP TO Fn=.450

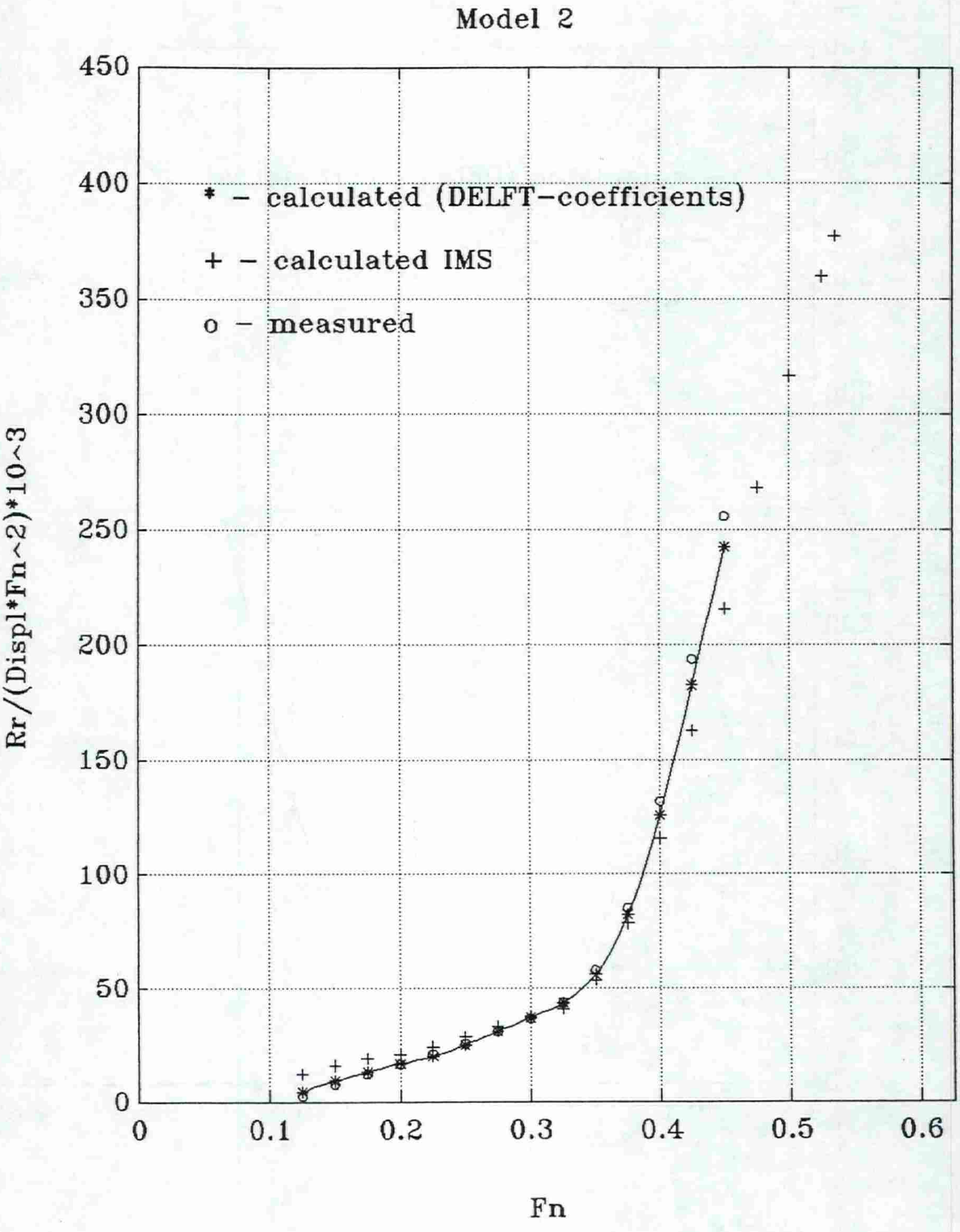
POLYNOMINAL	STD.-DEV.
DELFT-COEFFICIENTS	0.5407
ITC-COEFFICIENTS	0.6420
Cp and VOL of canue	0.5434
Cwa and Cp	0.6724
no Cp	1.0826
BTR and L/(DISPL^1/3)	1.2092

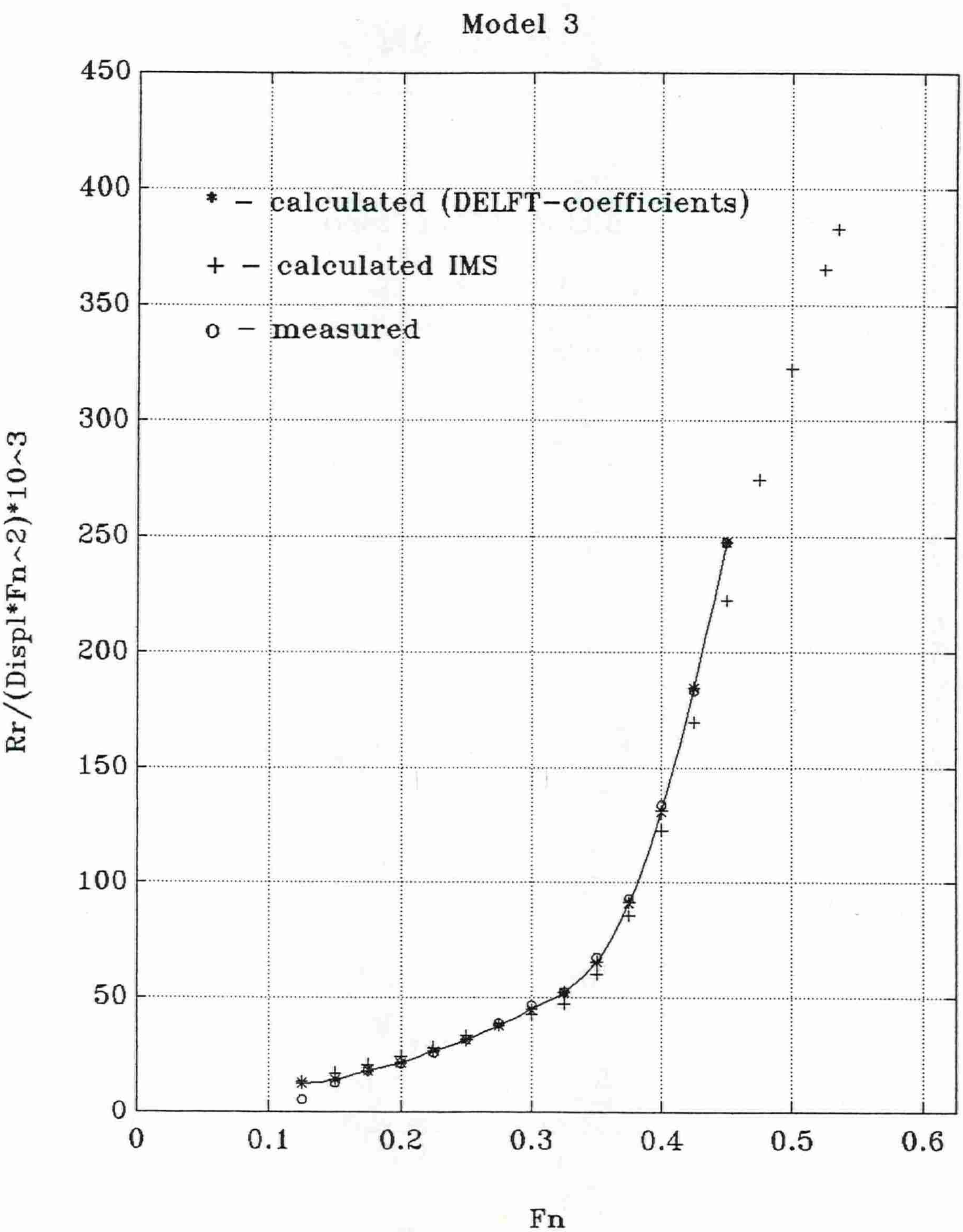
STANDARD DEVIATION OF RESIDUALS
OF ALL MODEL AND ALL SPEEDS FROM Fn=.450 TO Fn=.600

POLYNOMINAL	STD.-DEV.
DELFT-COEFFICIENTS	0.4415
ITC-COEFFICIENTS	0.7042



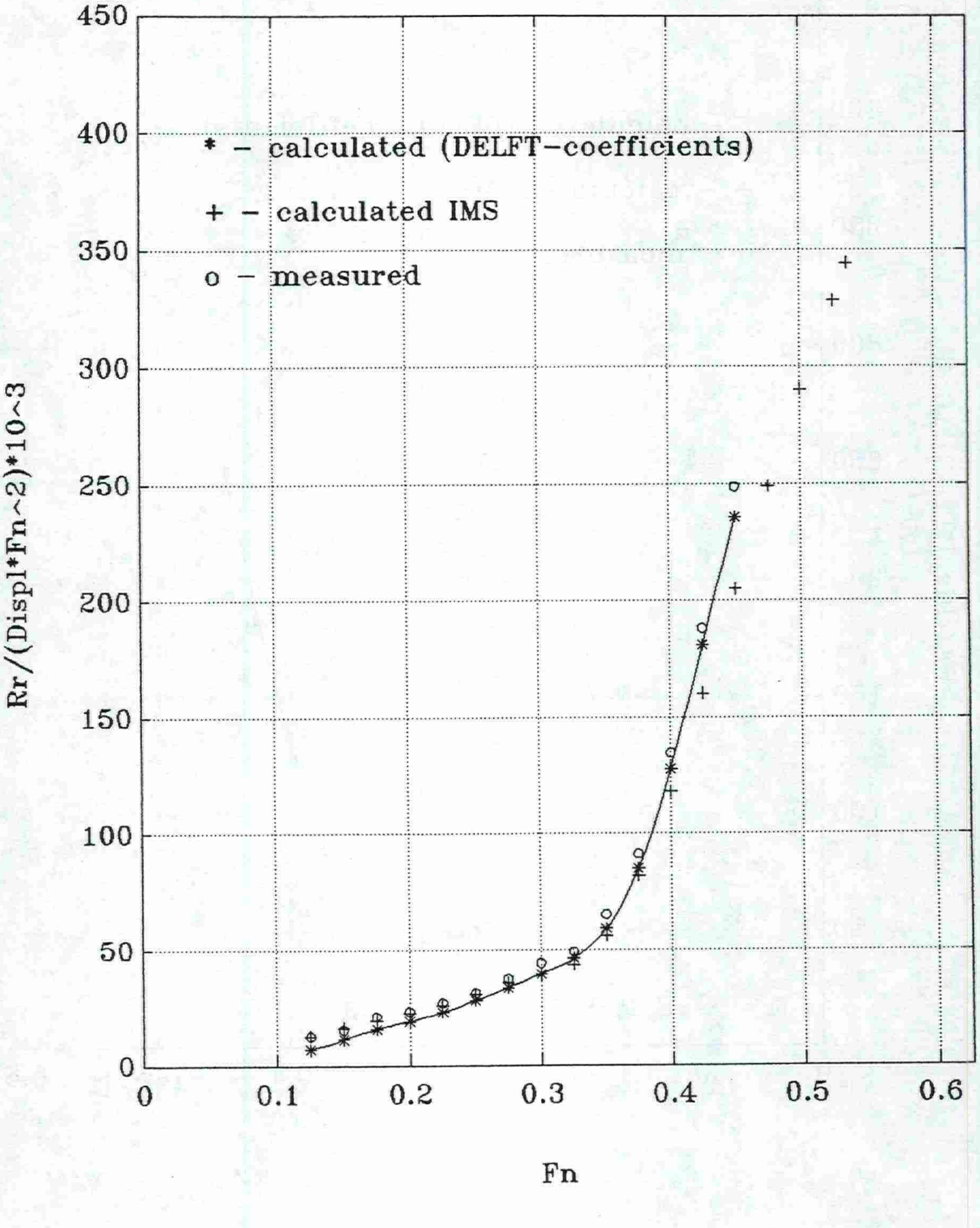
Model 1
* – calculated (DELFT–coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 2
* – calculated (DELFT–coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6



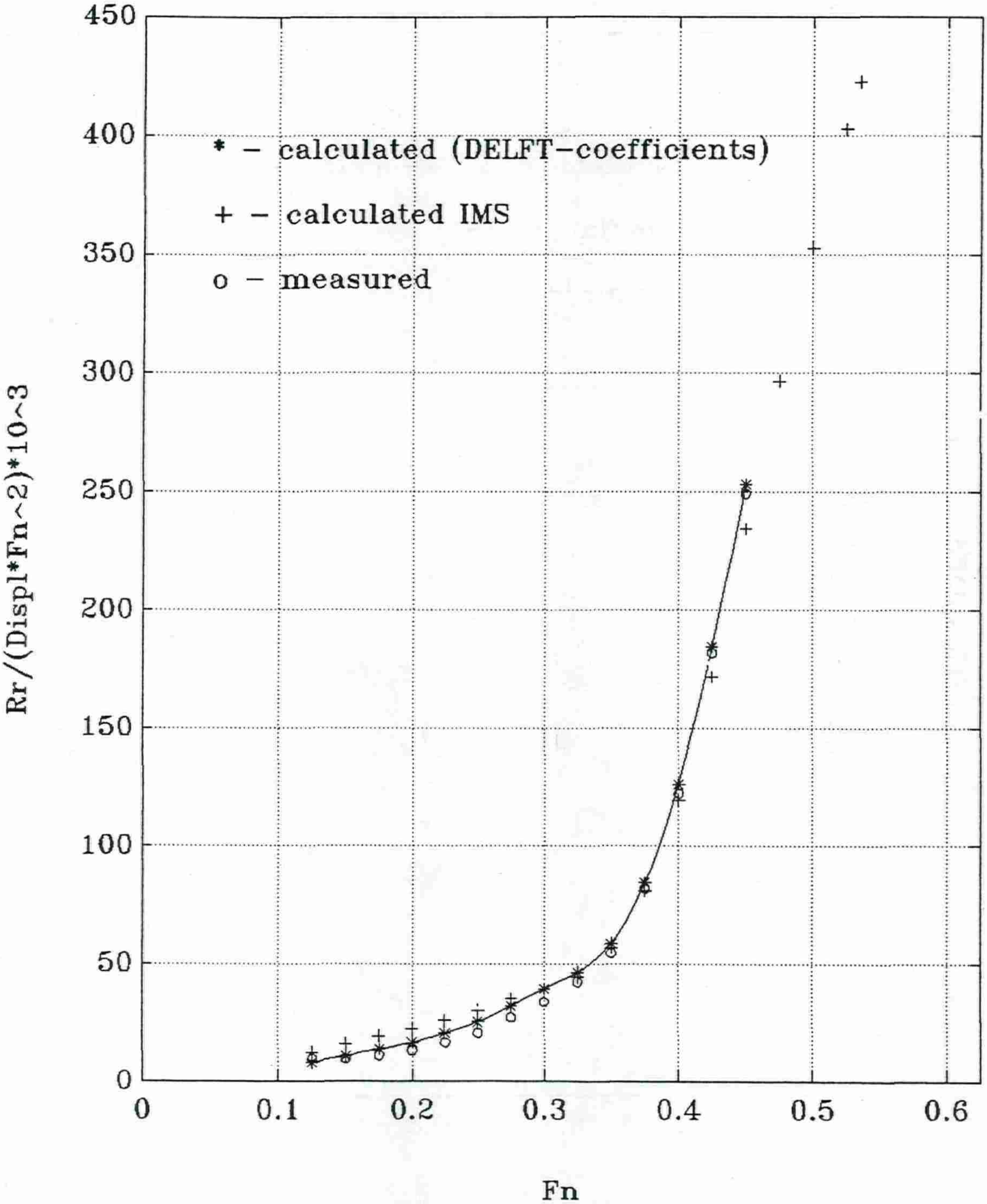
Model 3
* – calculated (DELFT–coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

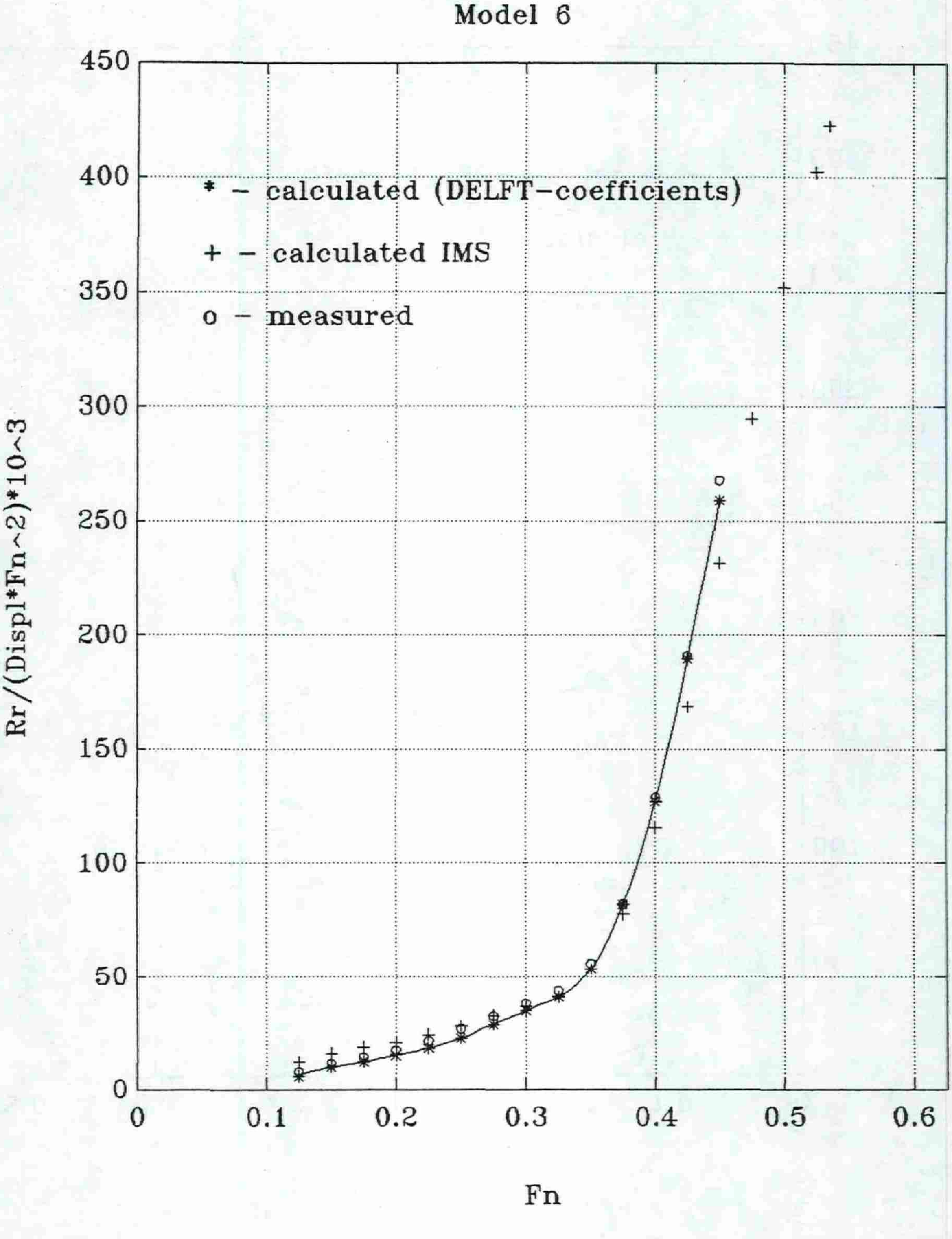
Model 4



* – calculated (DELFT-coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

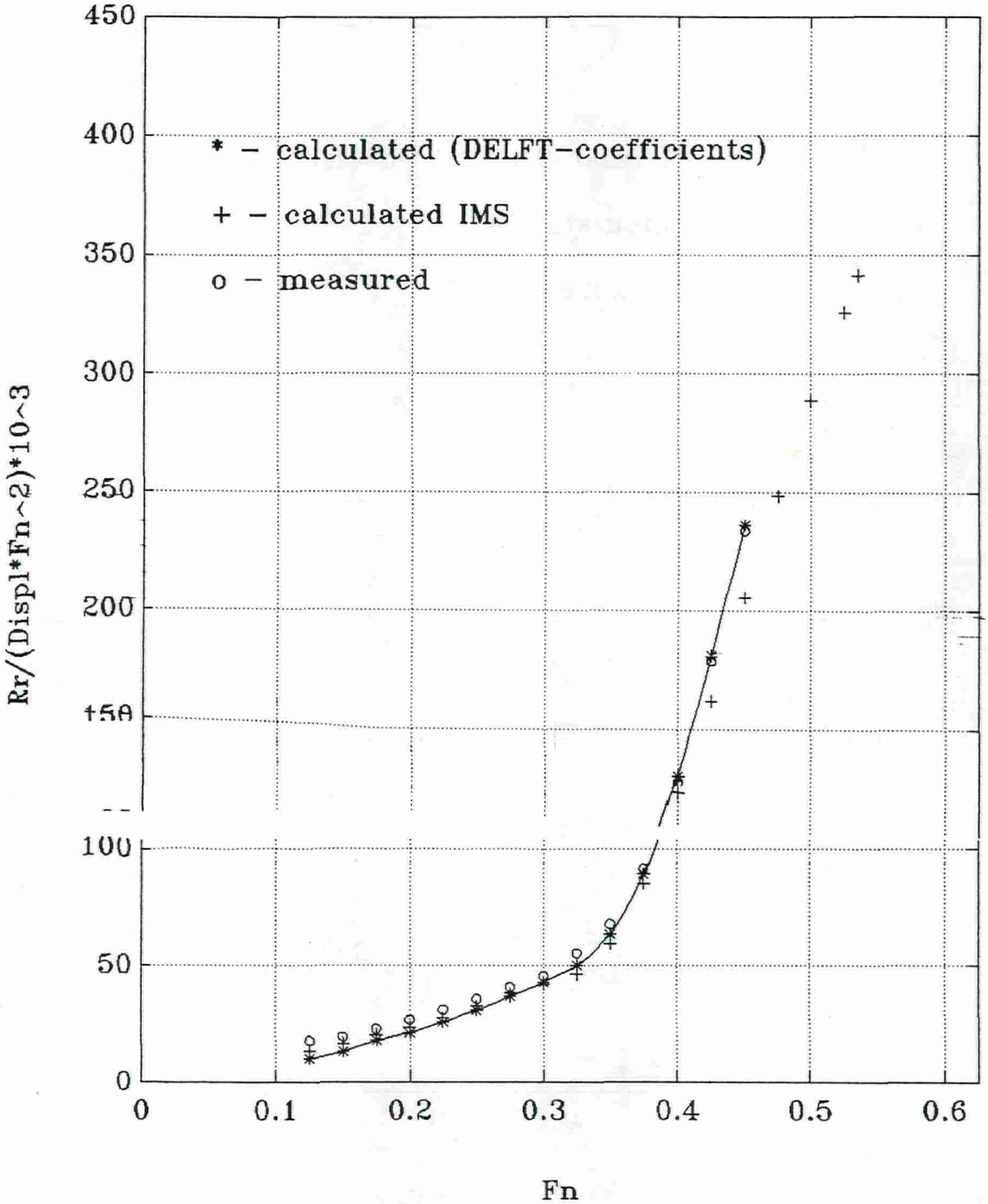
Model 5


* – calculated (DELFT–coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6



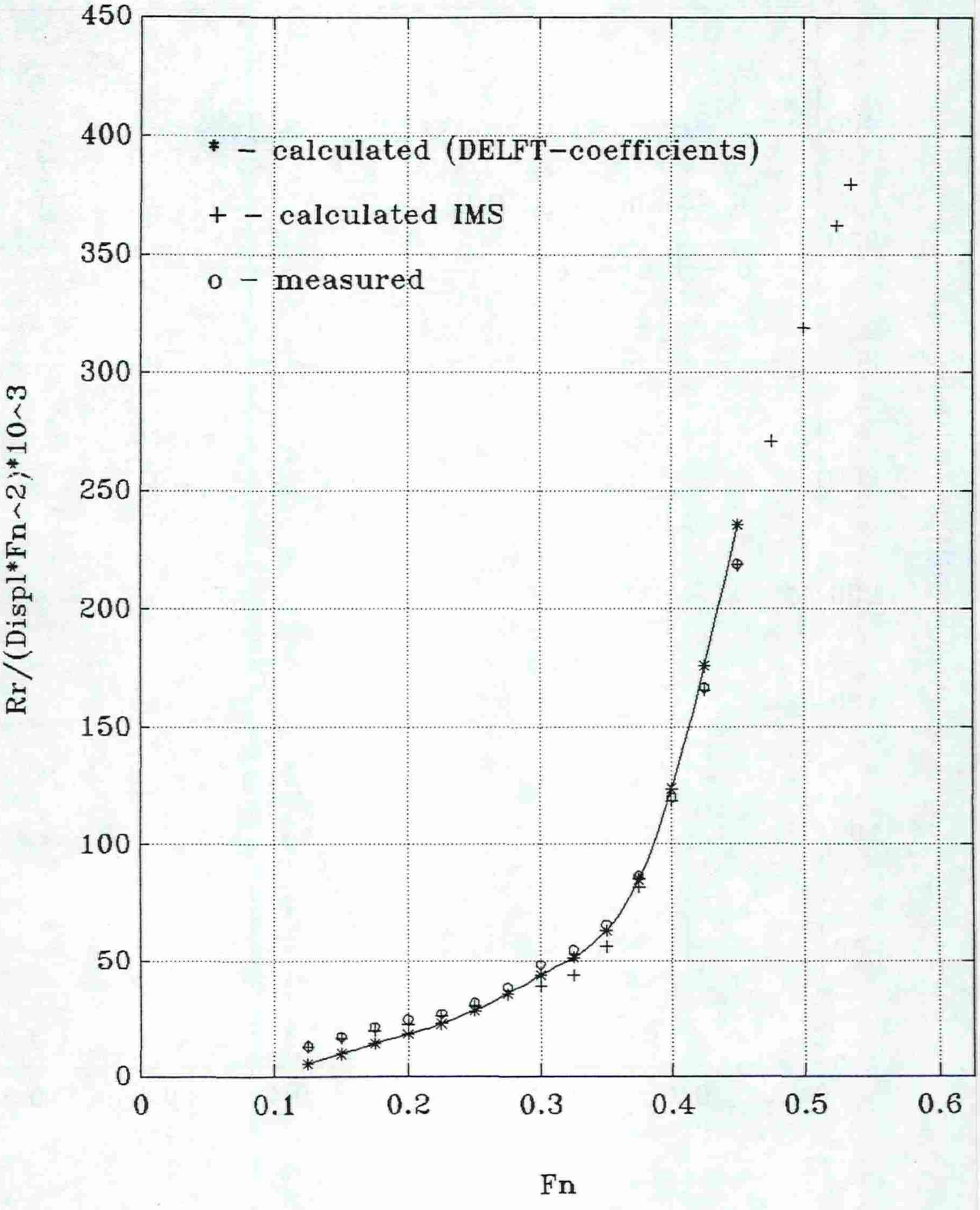
Model 6
450
400
350
300
250
200
150
100
50
0
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

Model 7

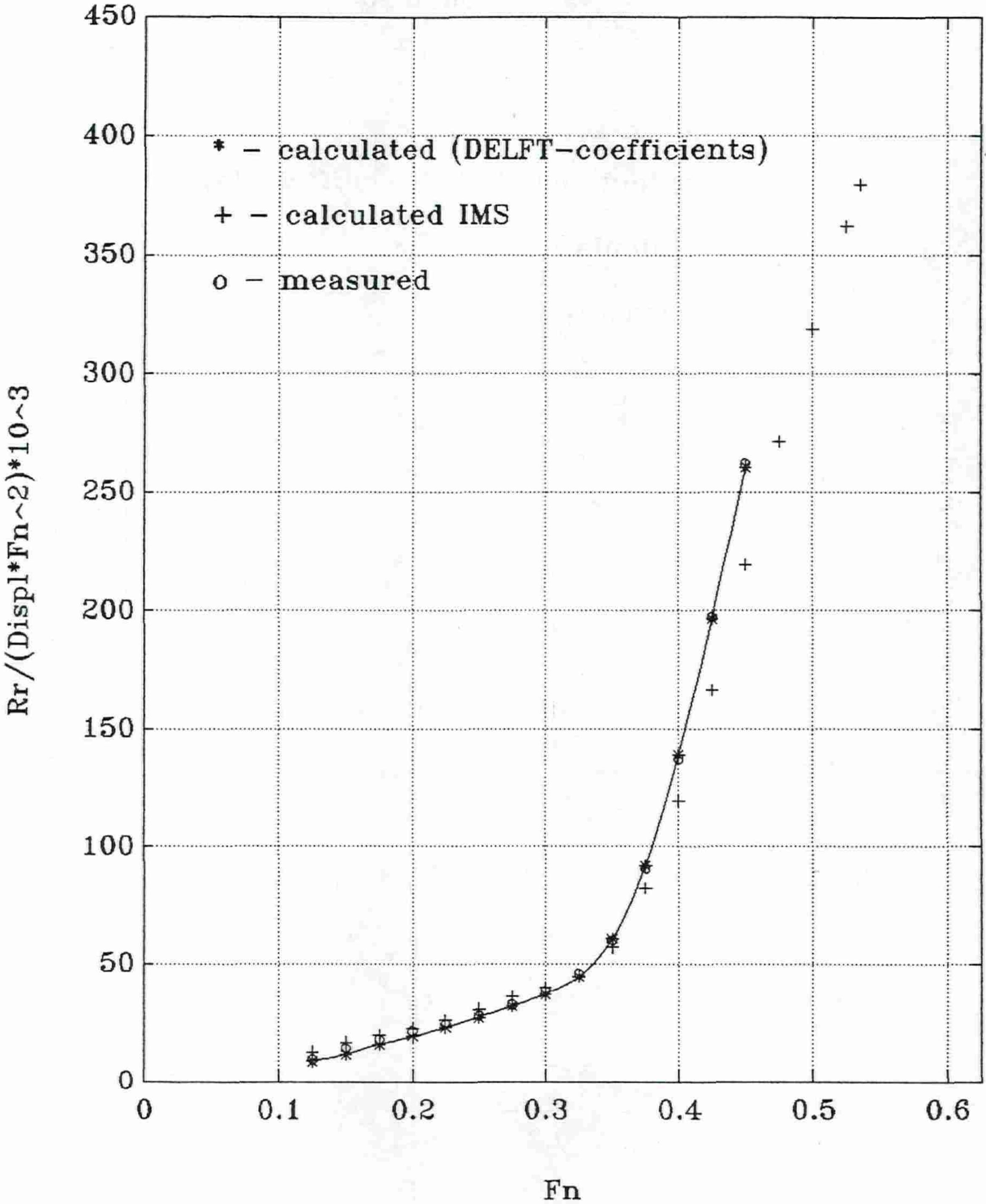


450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

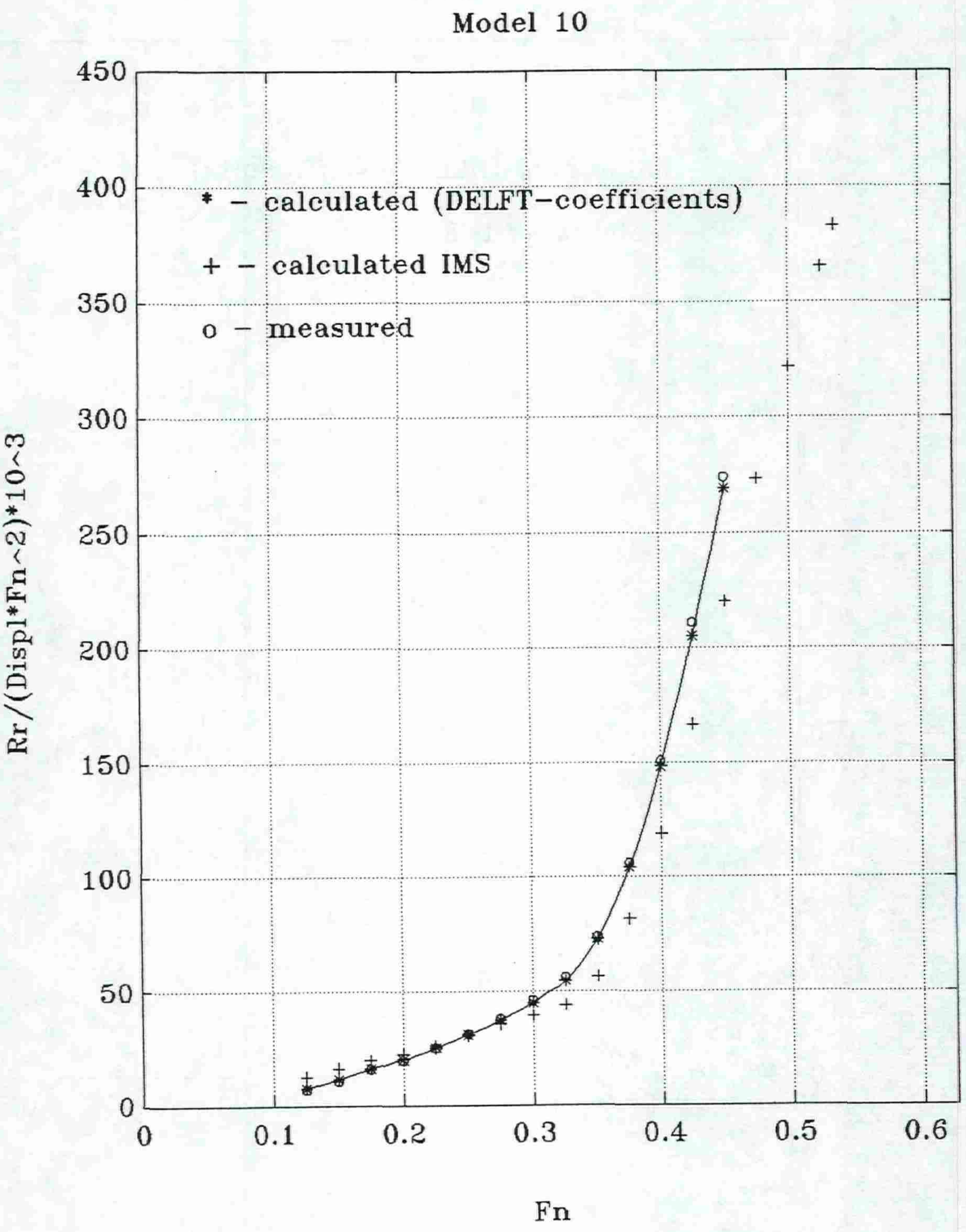
Model 8

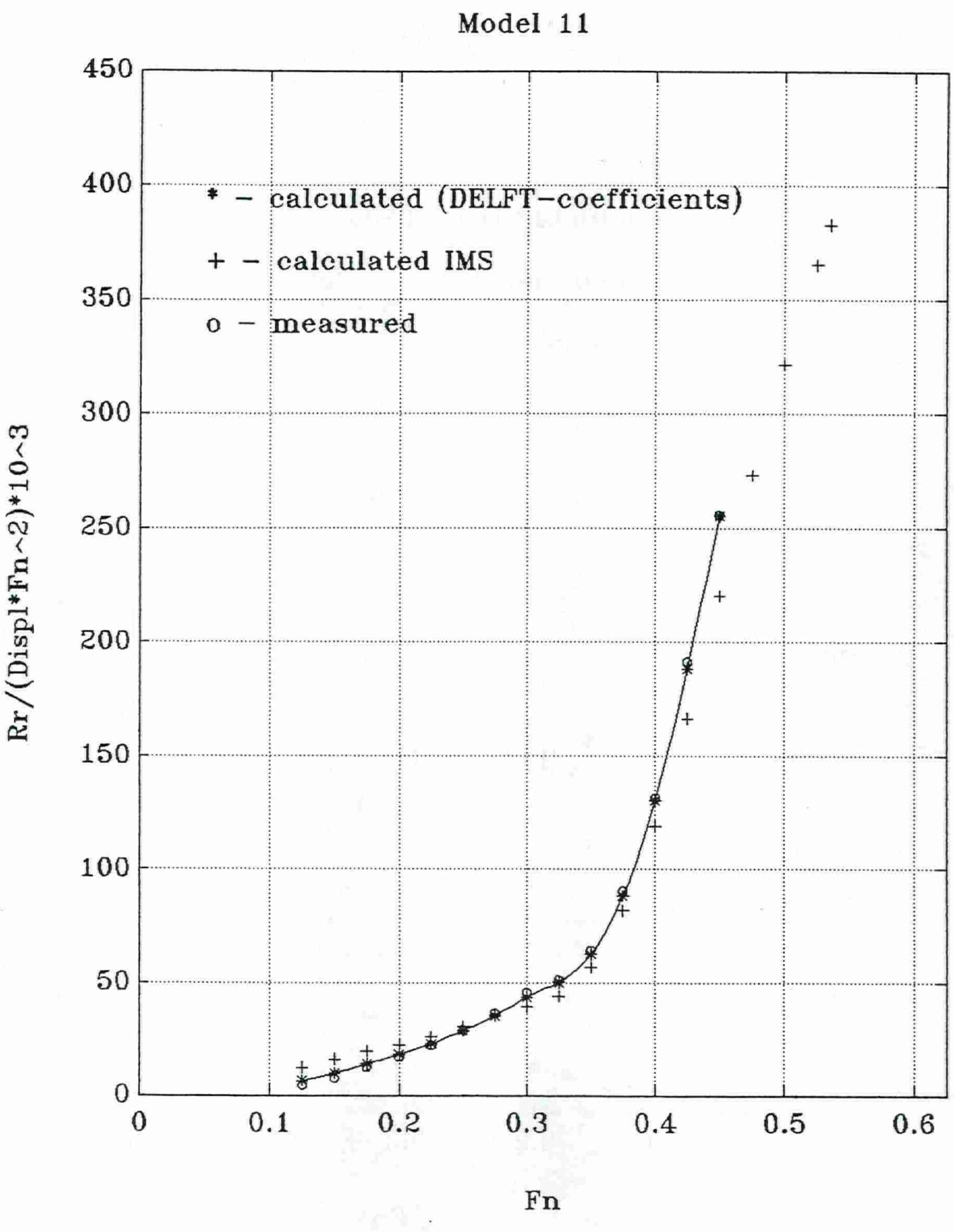

* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

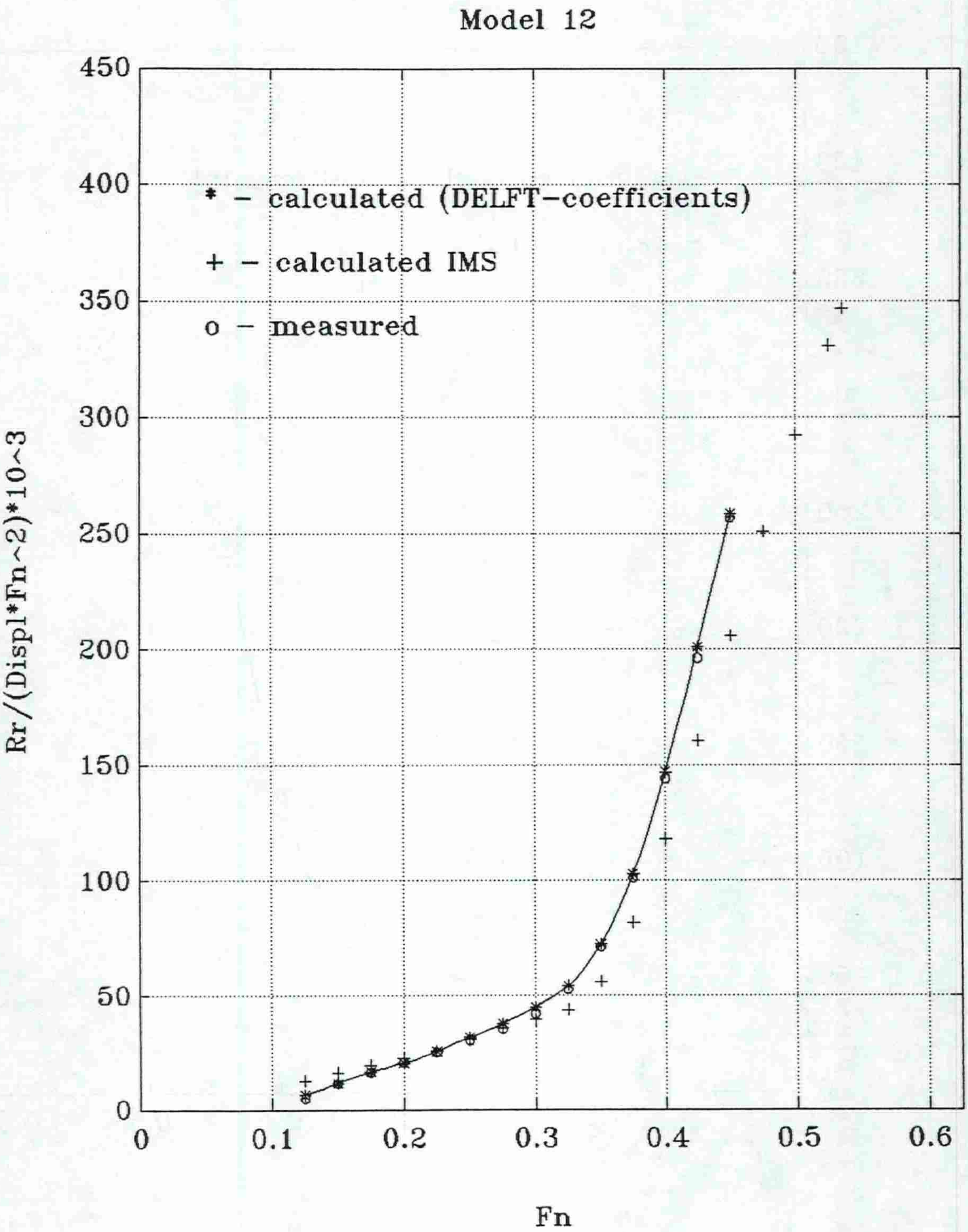
Model 9

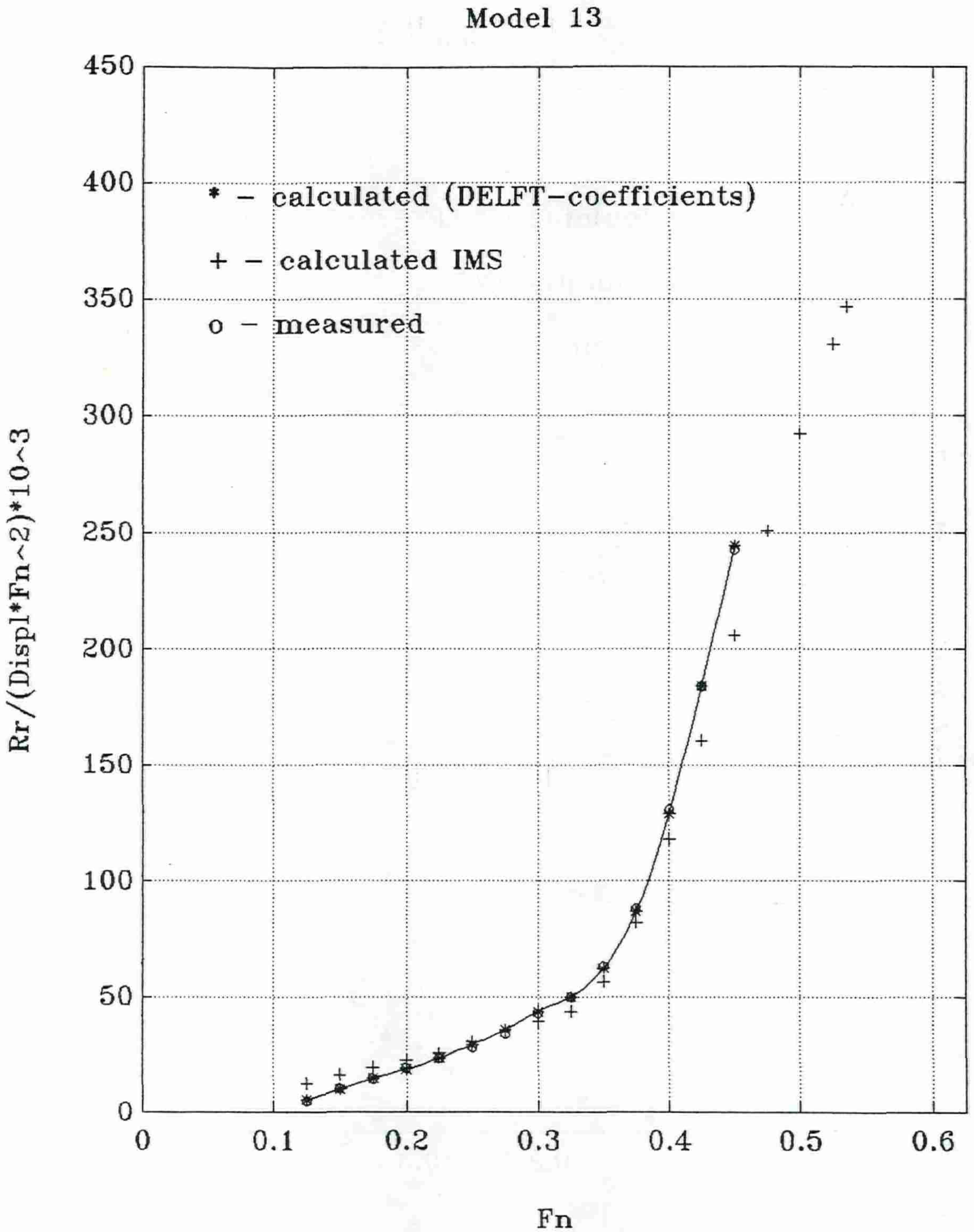


* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn


Model 10
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

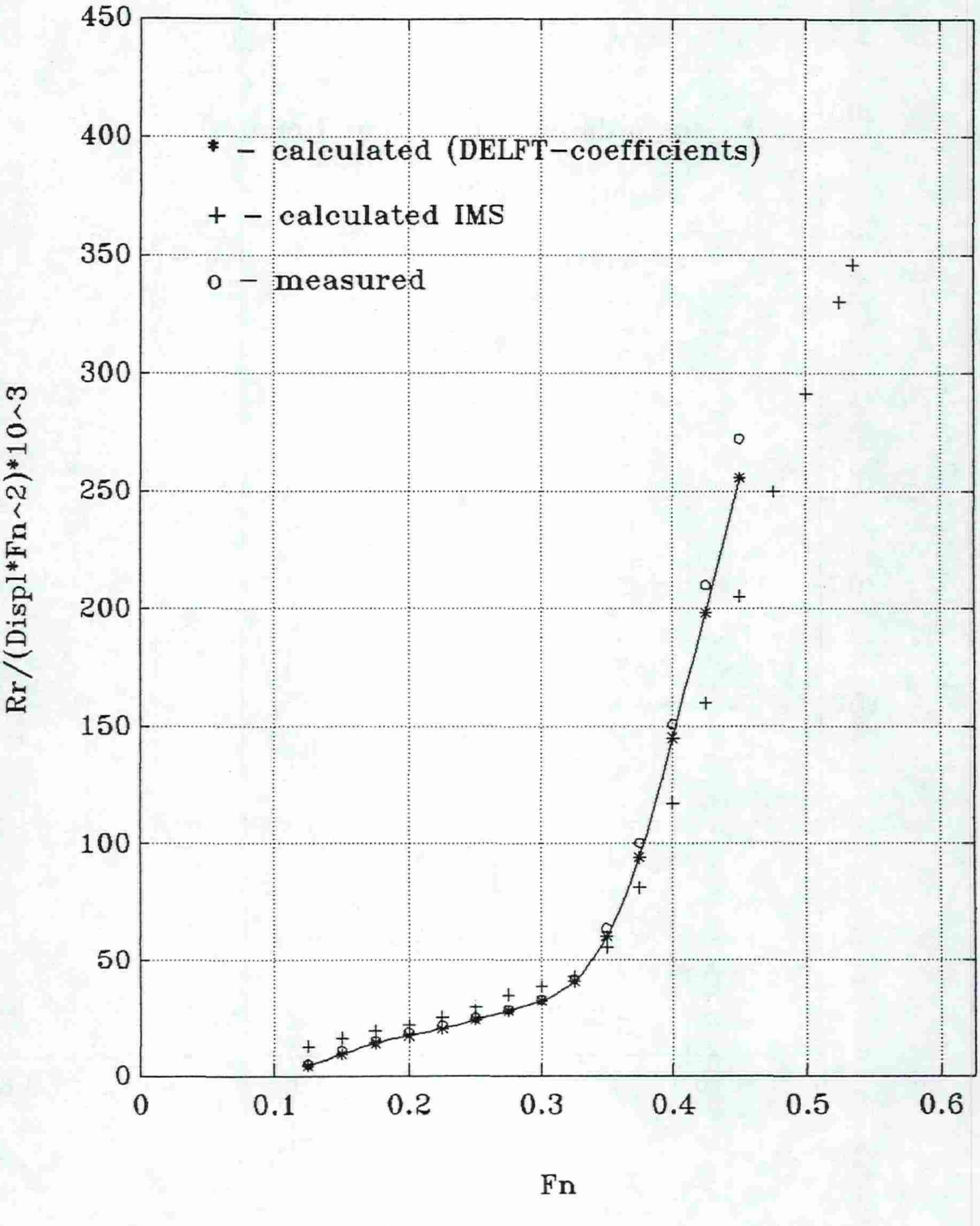

Model 11
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 12
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

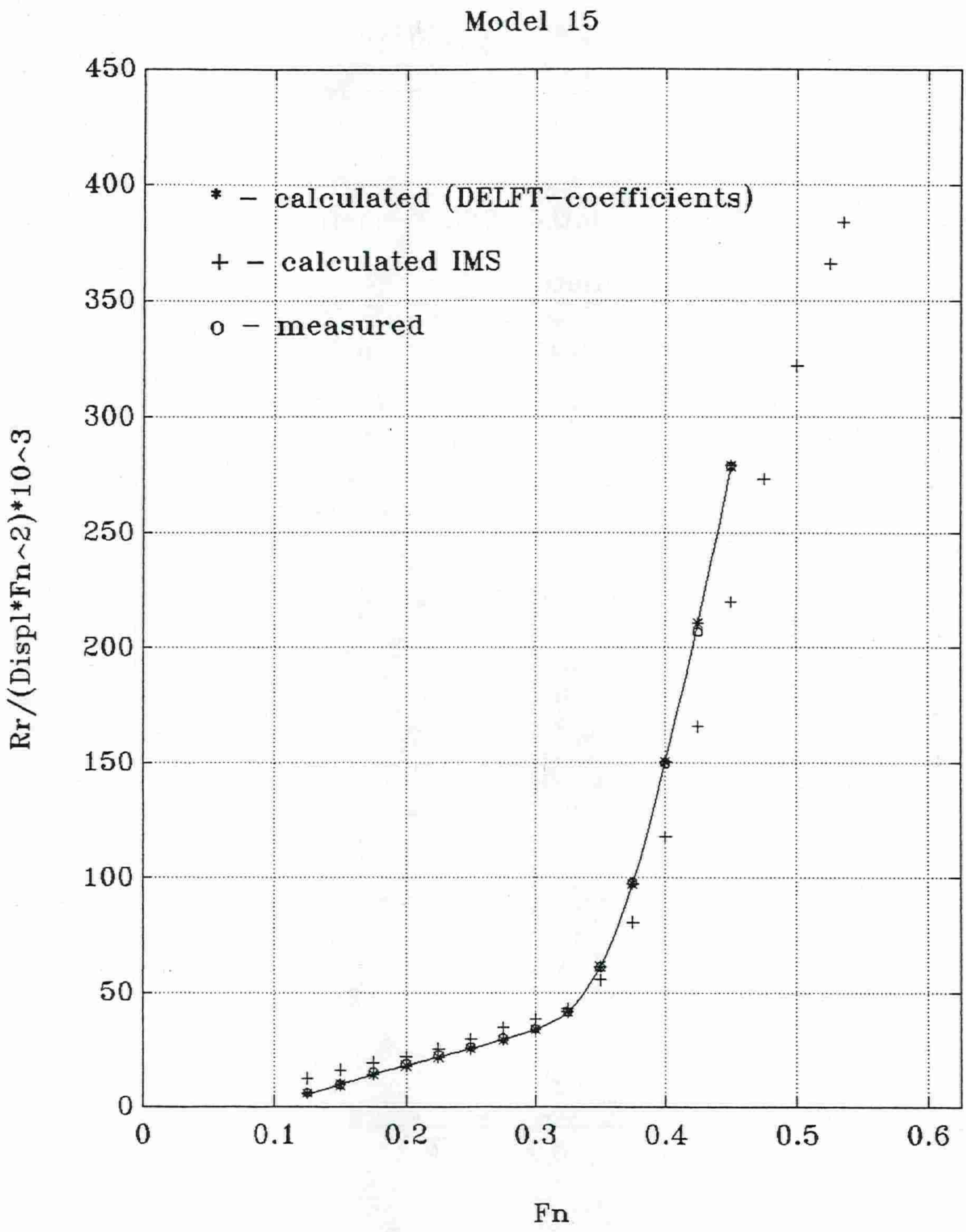


Model 13
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0.1
0.2
0.3
0.4
0.5
0.6

Model 14

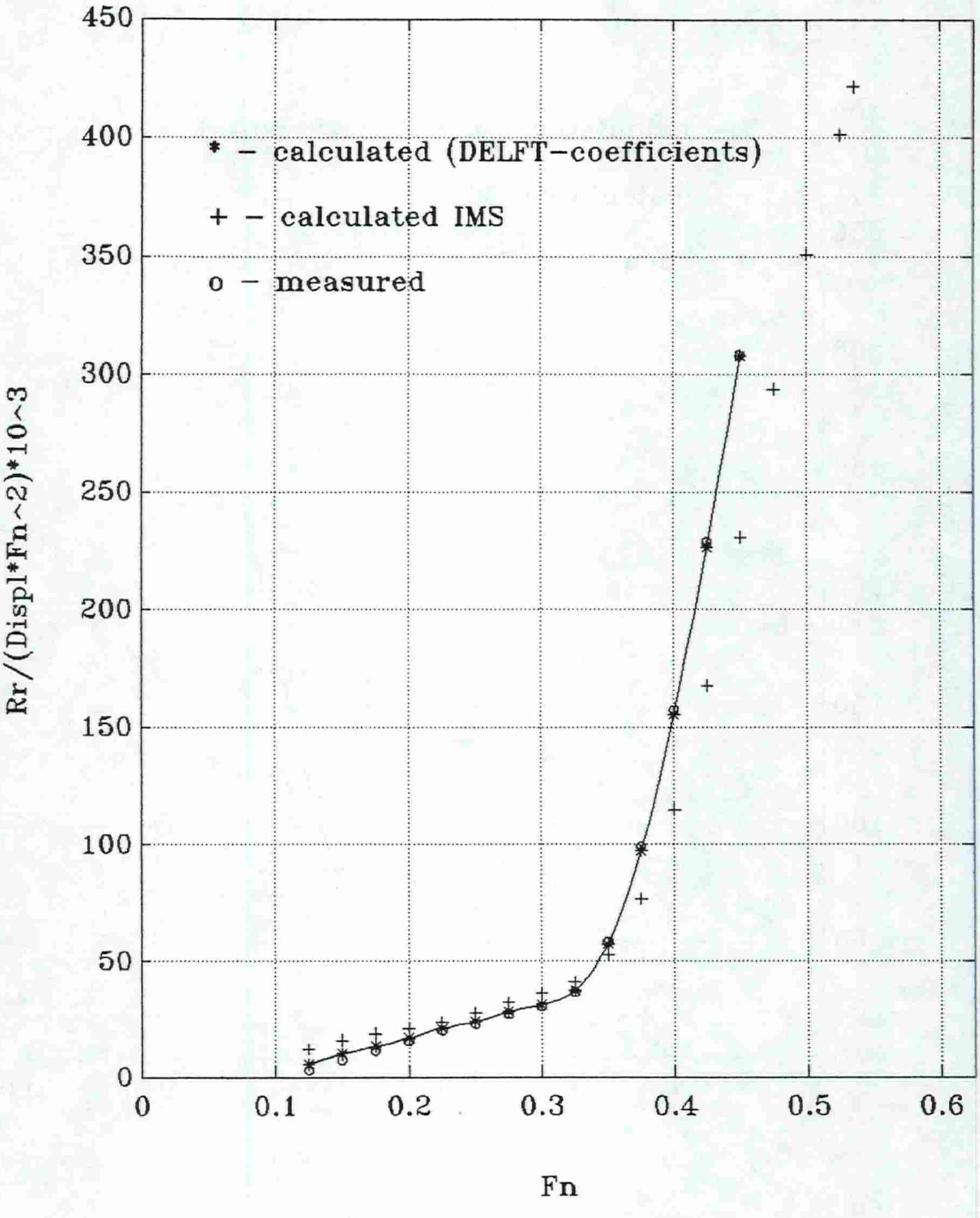


450
400
350
300
250
200
150
100
50
0
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn



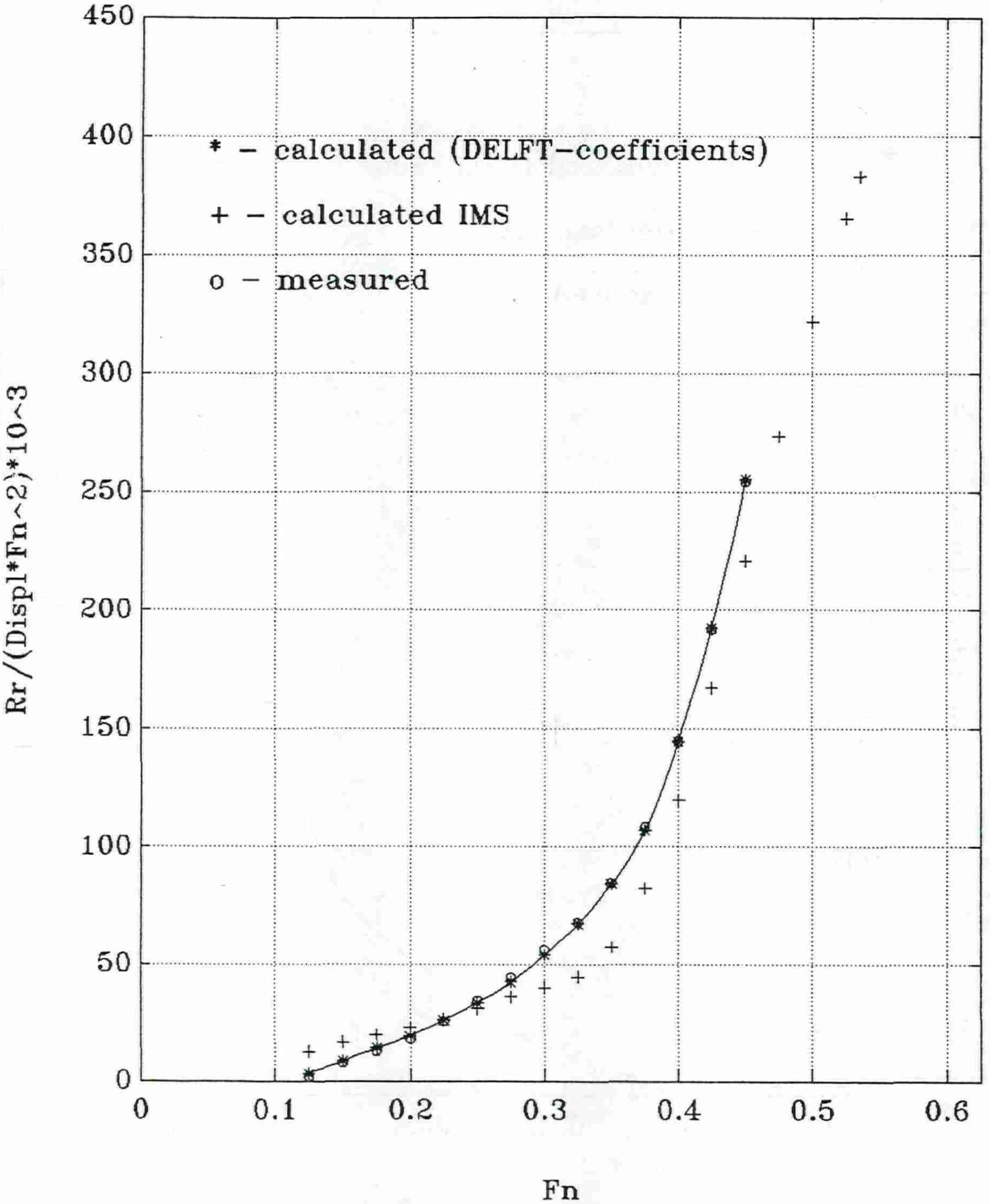
Model 15
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

Model 16



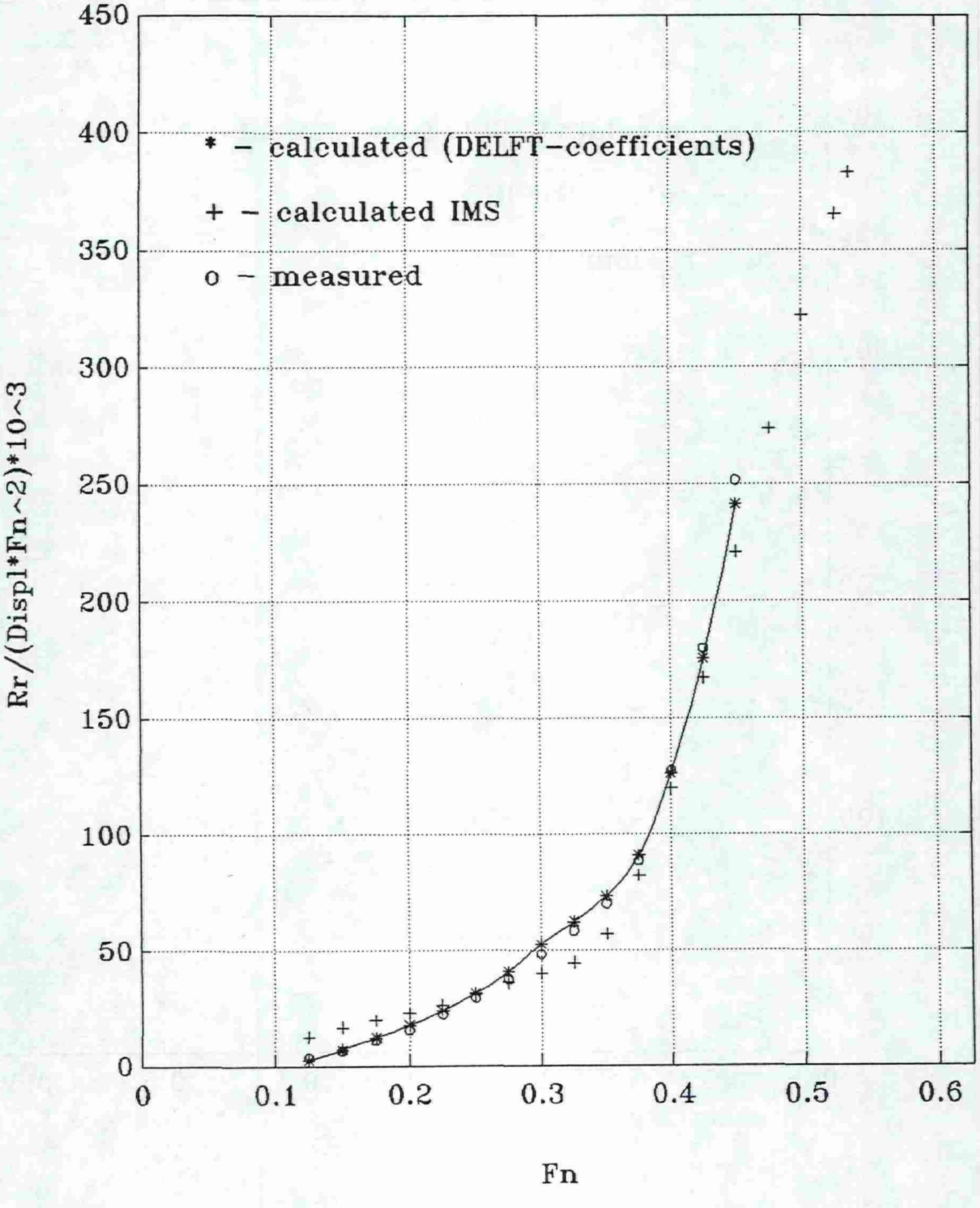
450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

Model 17

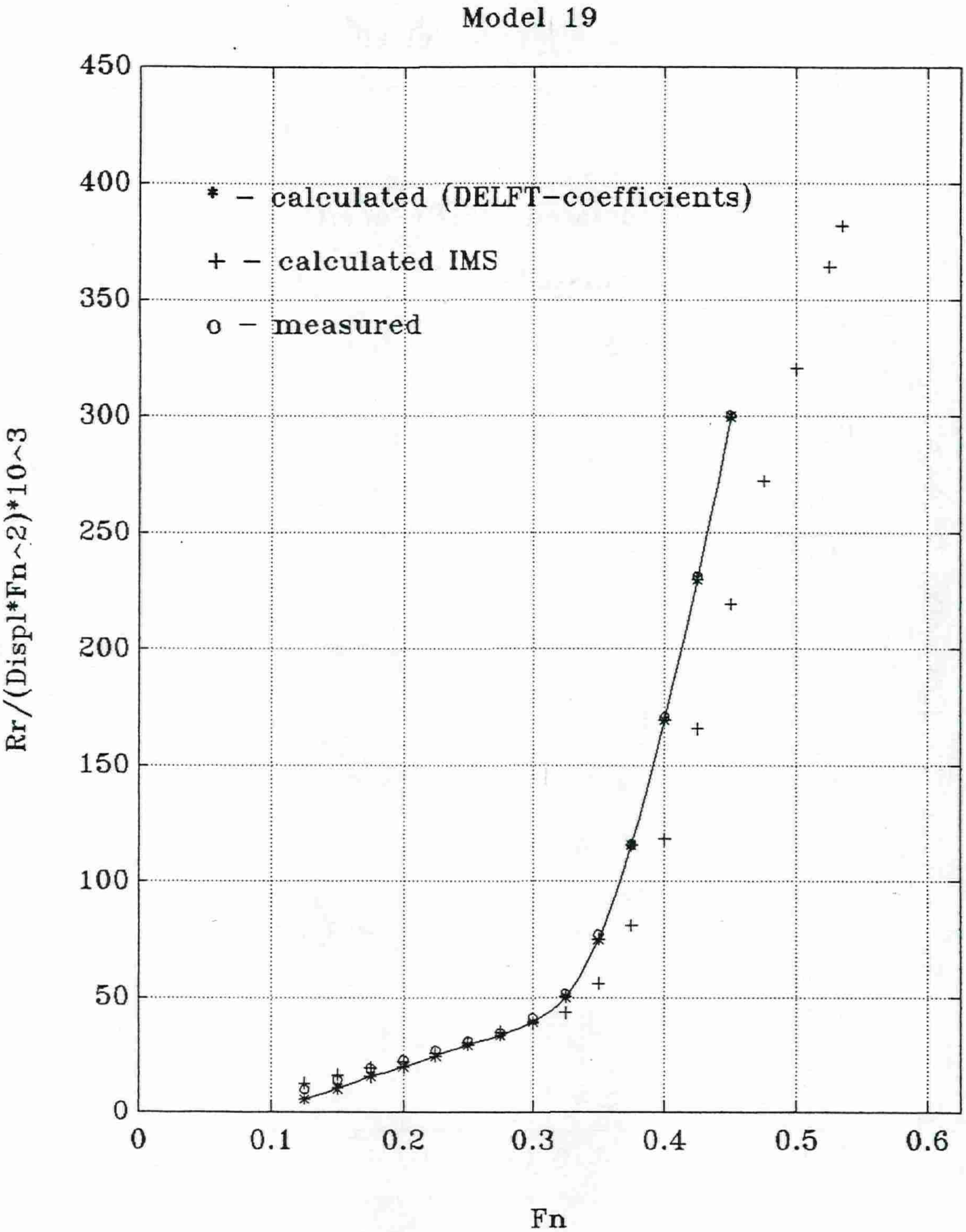


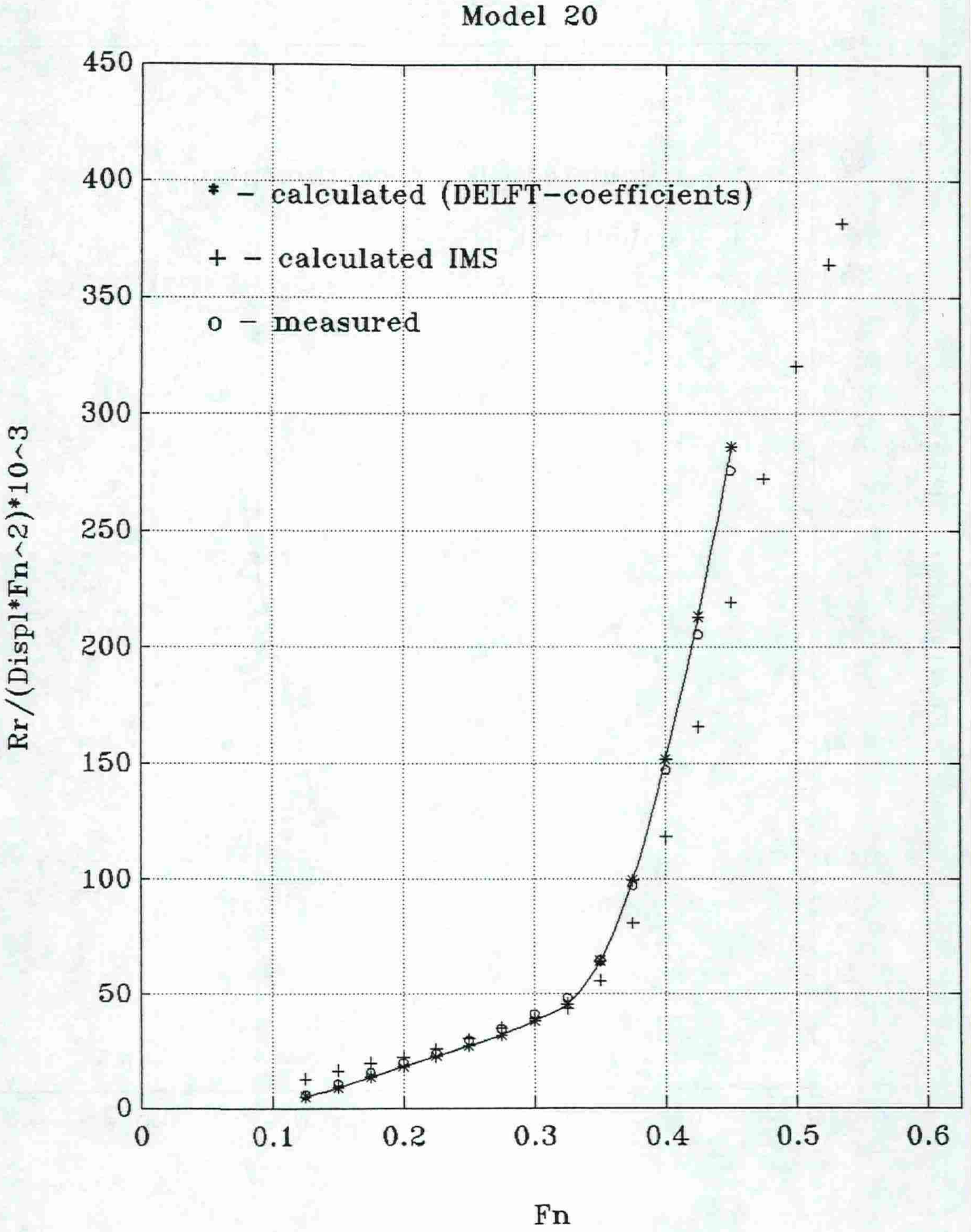
* – calculated (DELFT-coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

Model 18

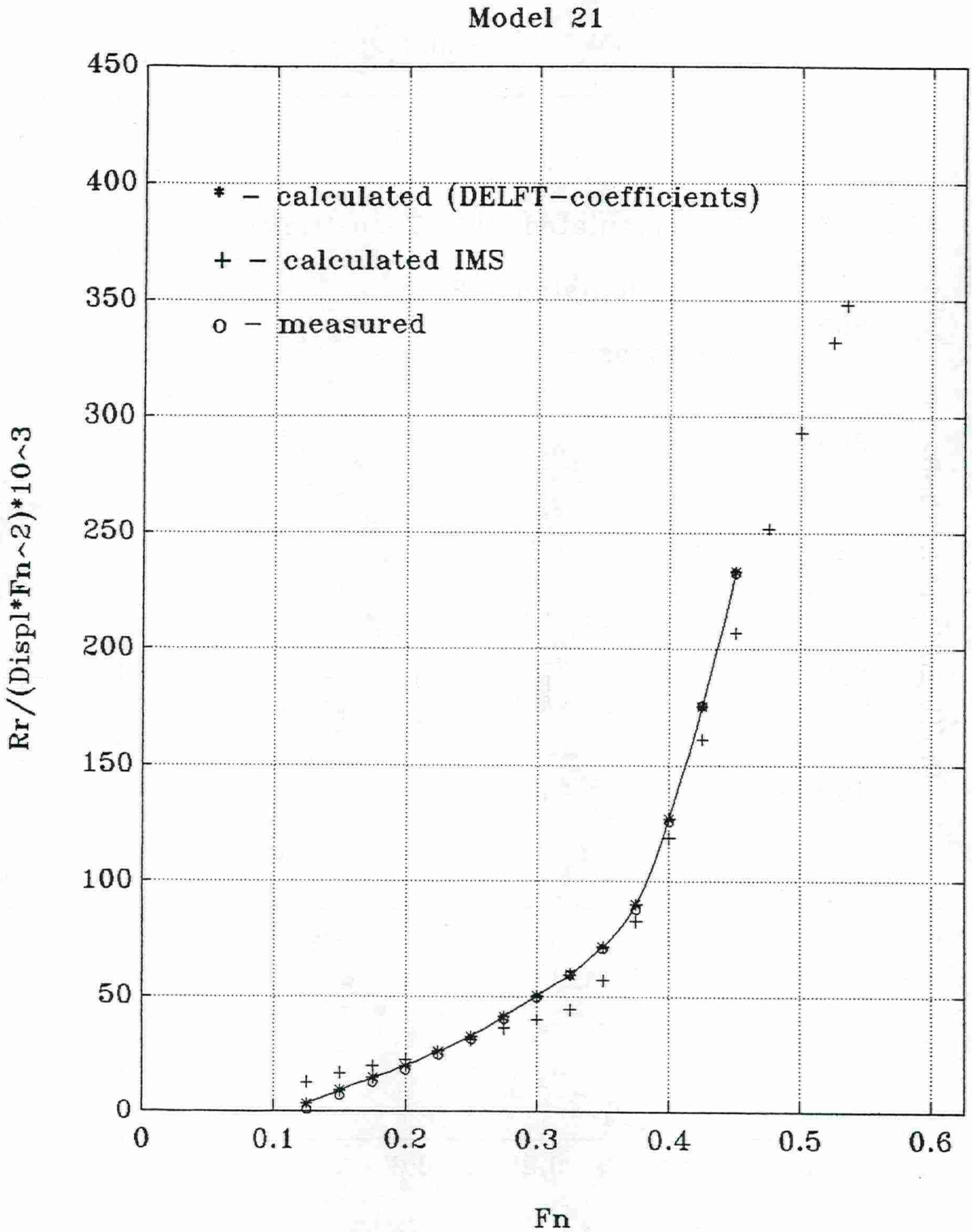


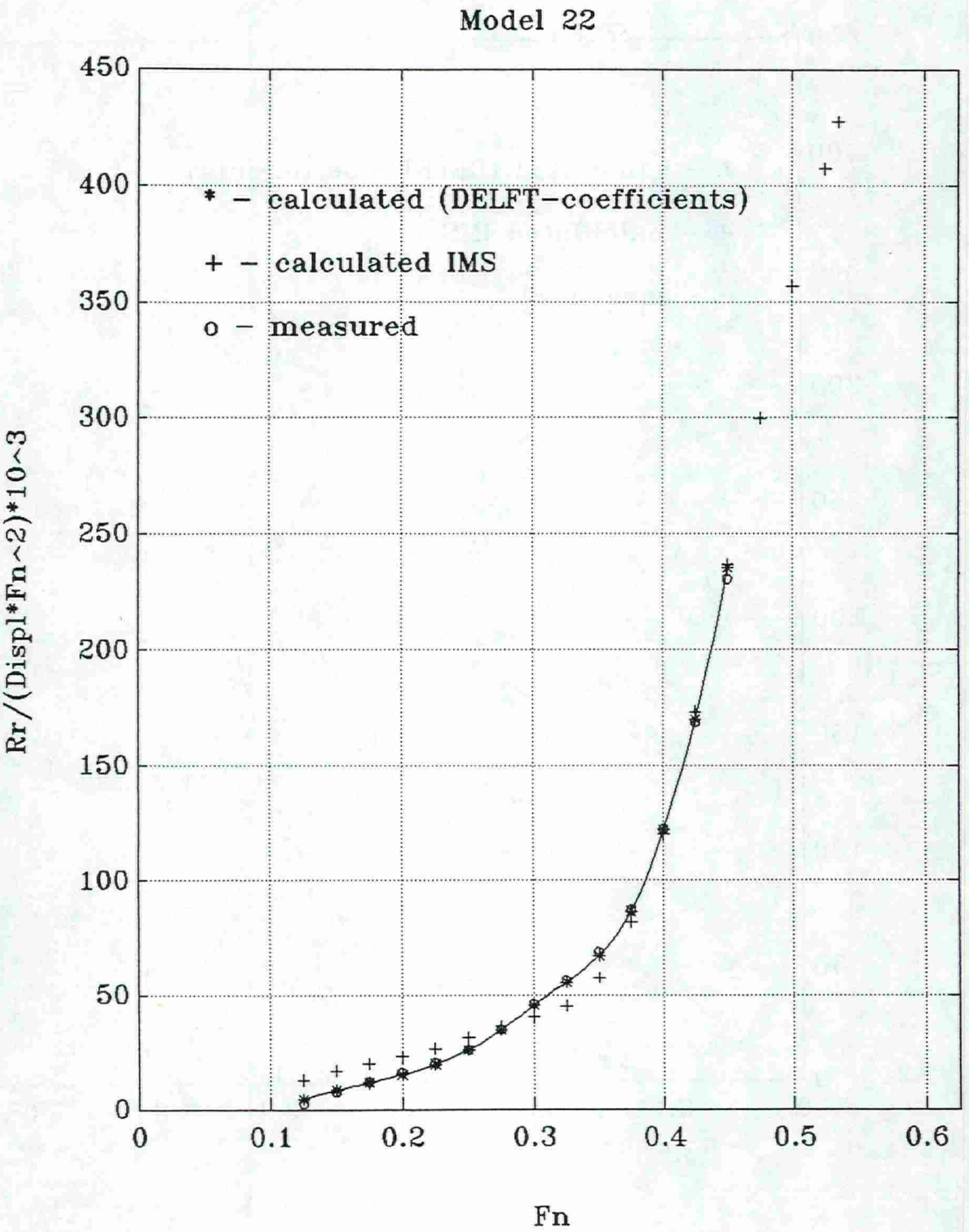
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 19
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

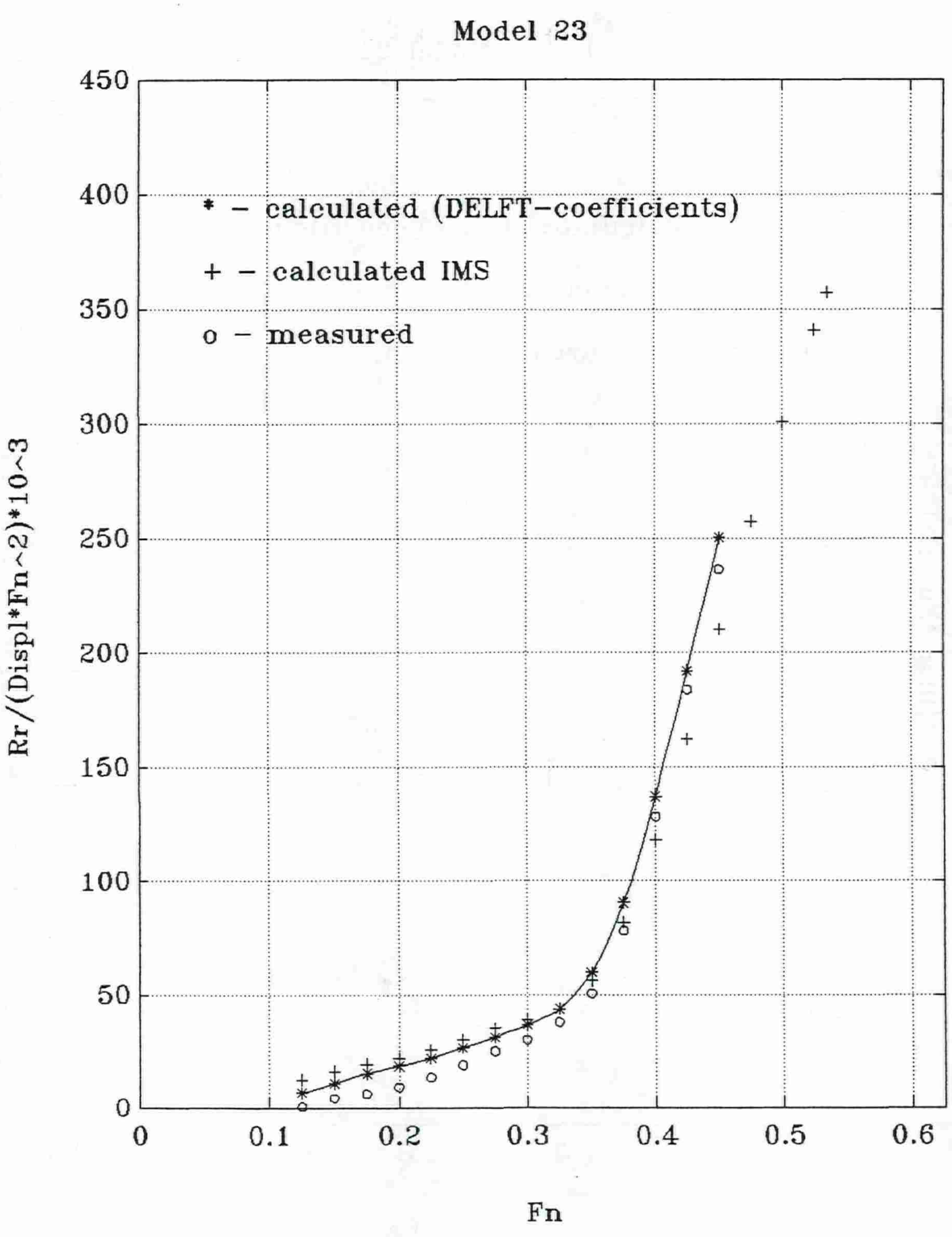


Model 20
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

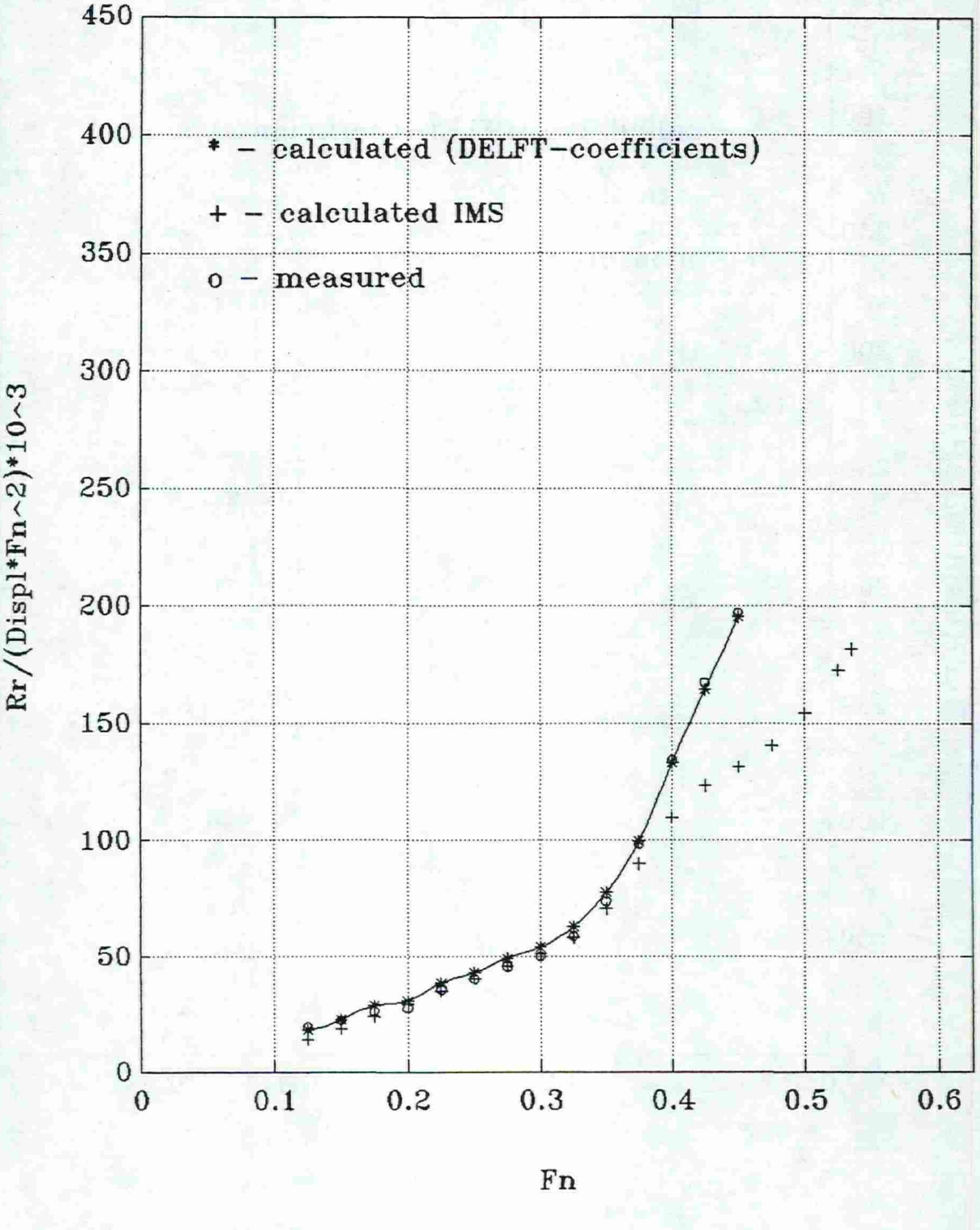

Model 21
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6



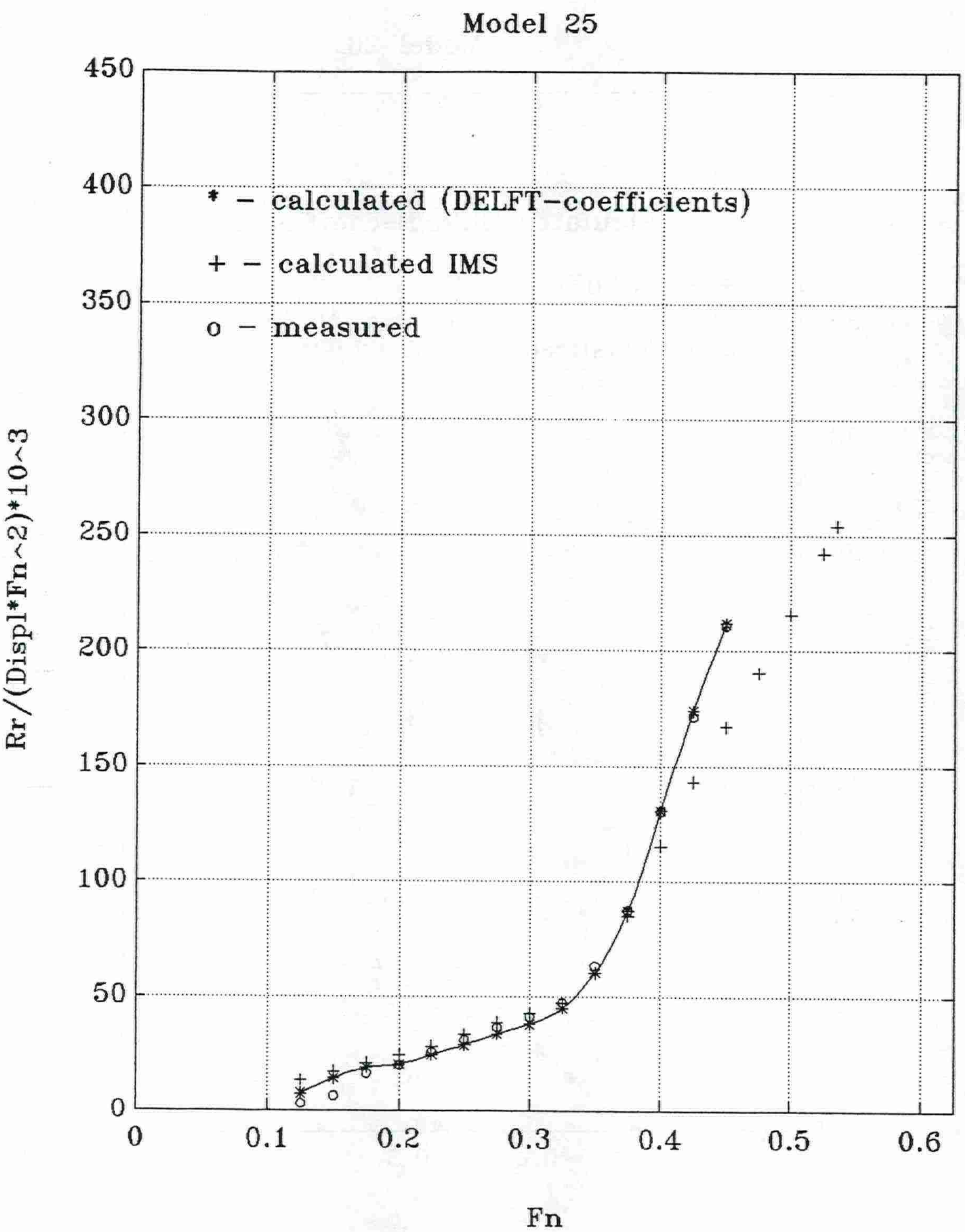
Model 22
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

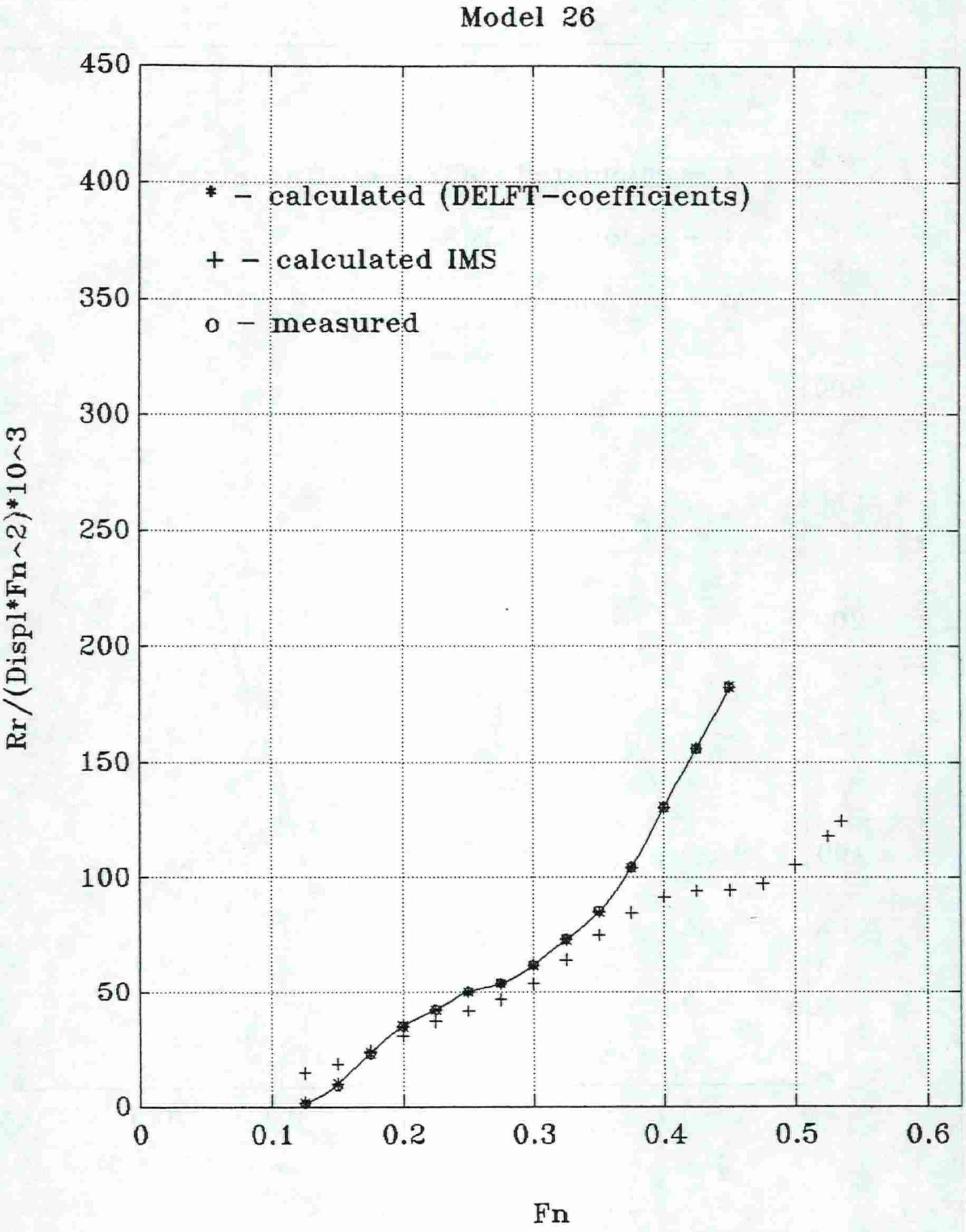

Model 23
* – calculated (DELFT-coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

Model 24

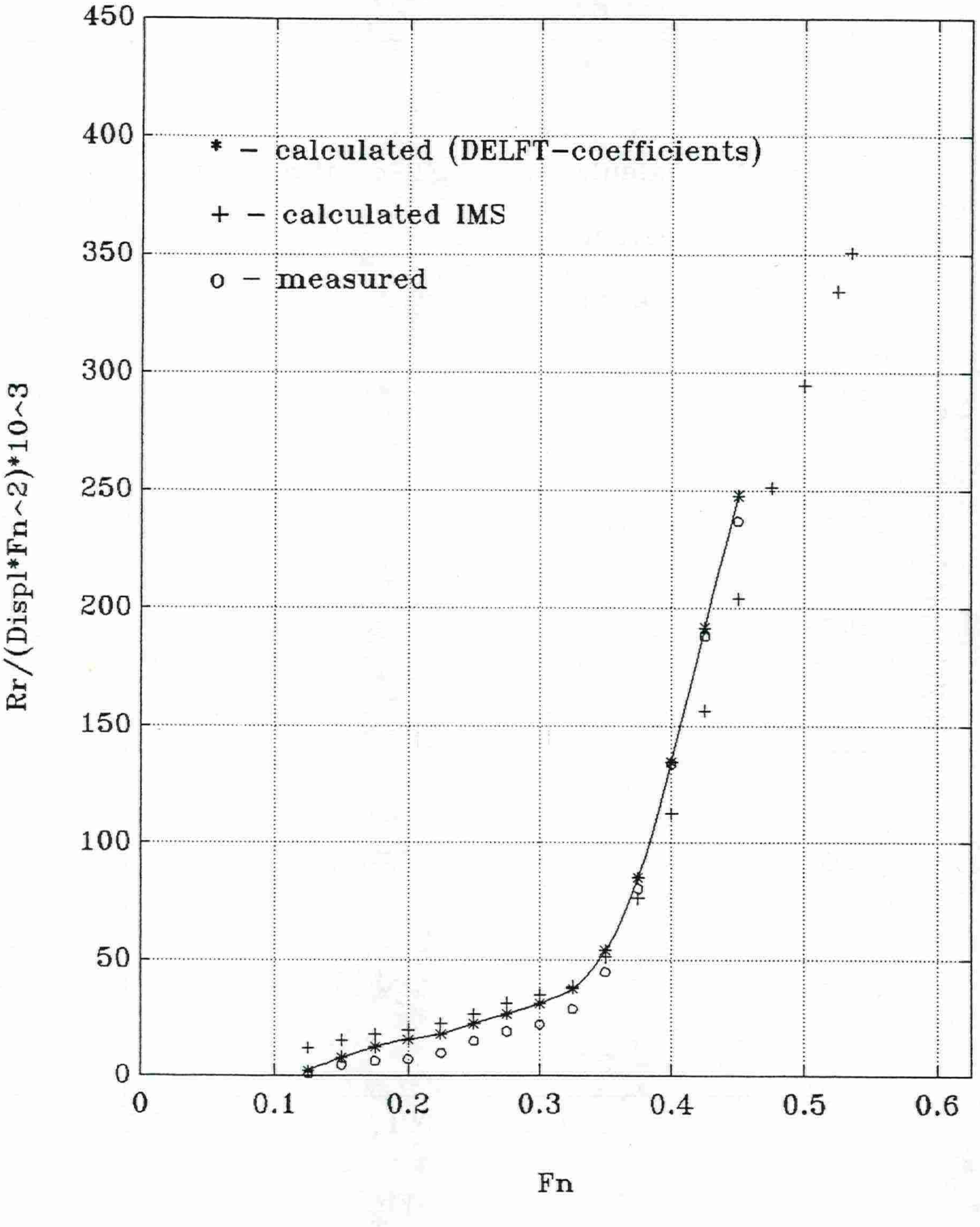


* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

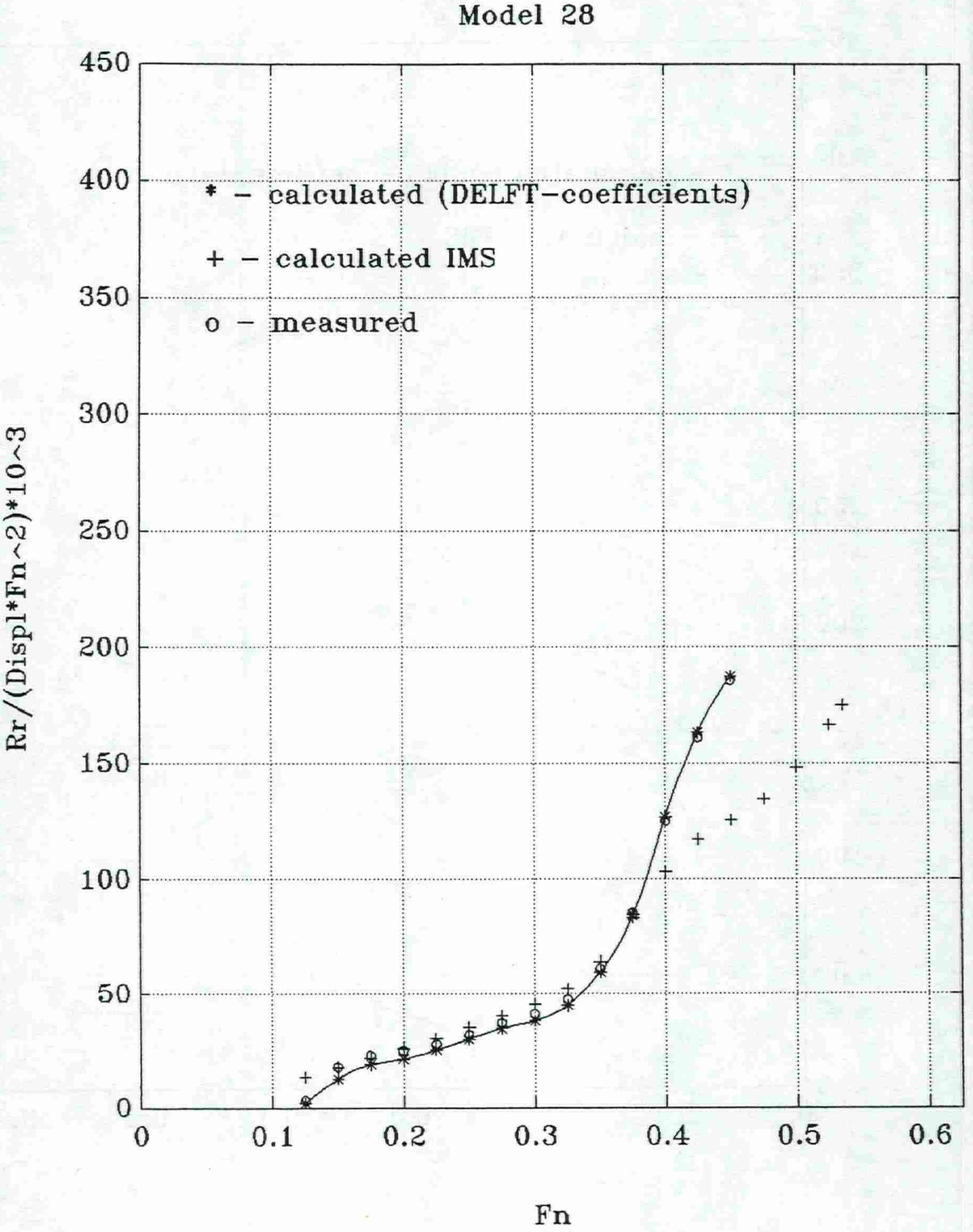

Model 25
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0.1
0.2
0.3
0.4
0.5
0.6

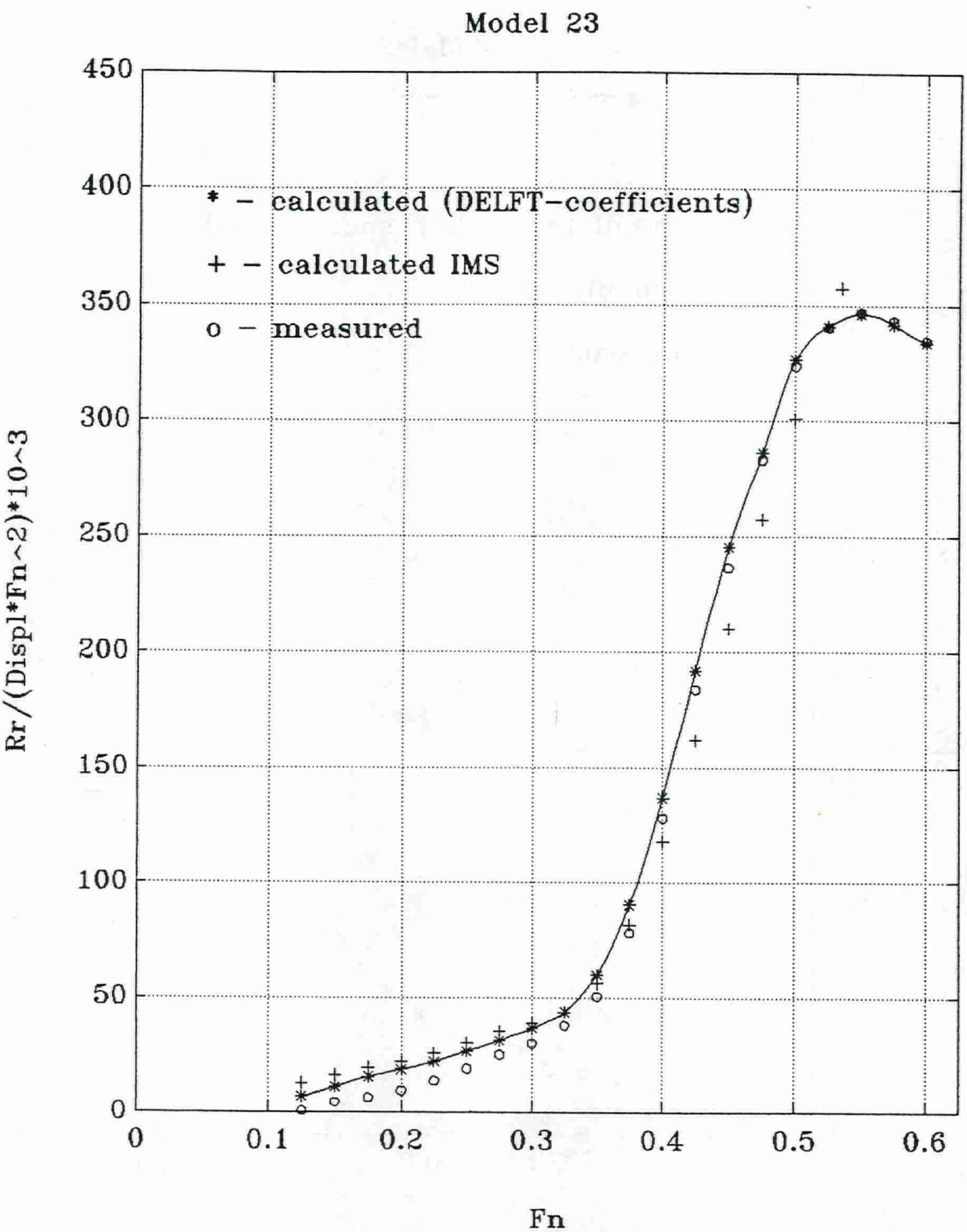

Model 26
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

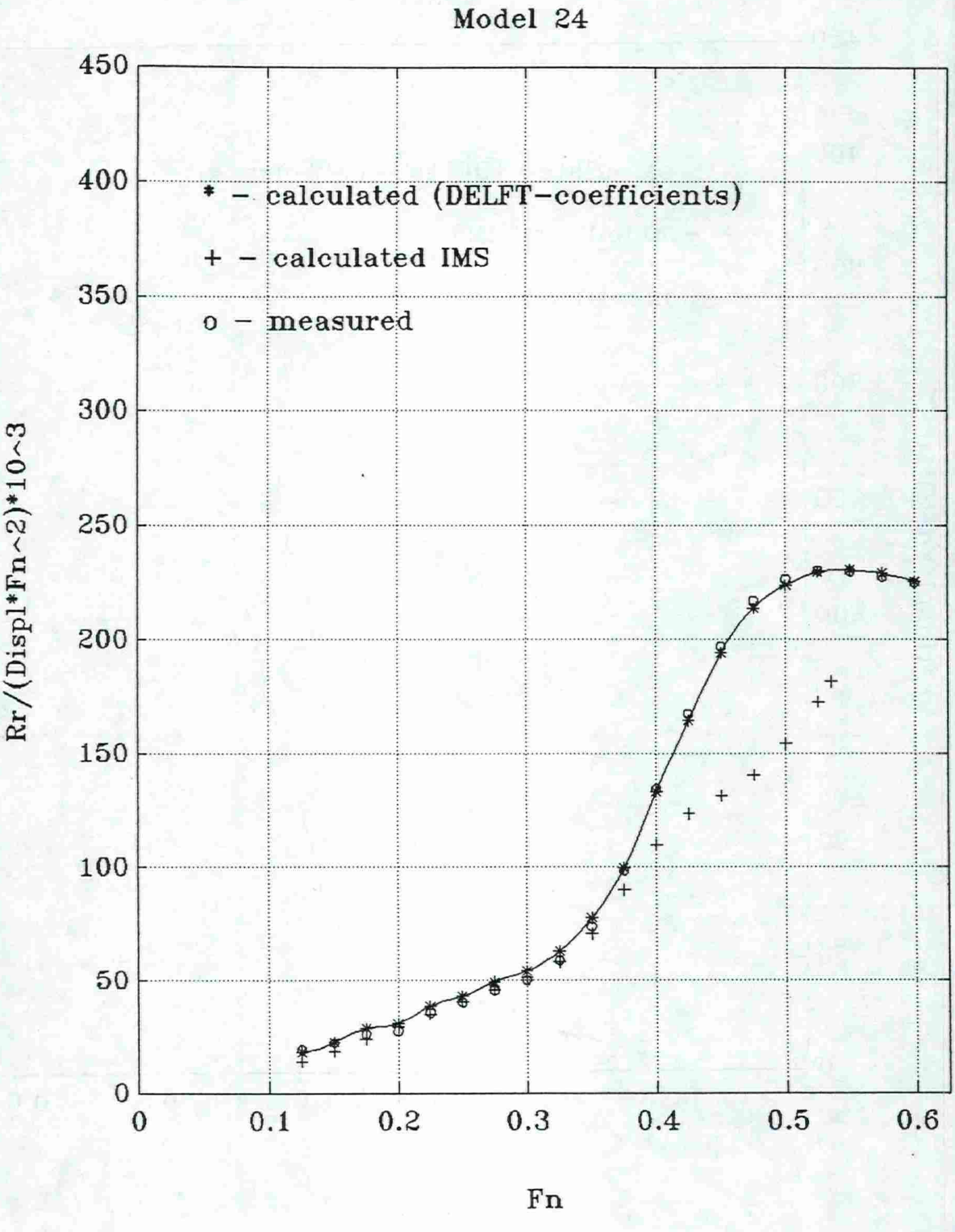
Model 27



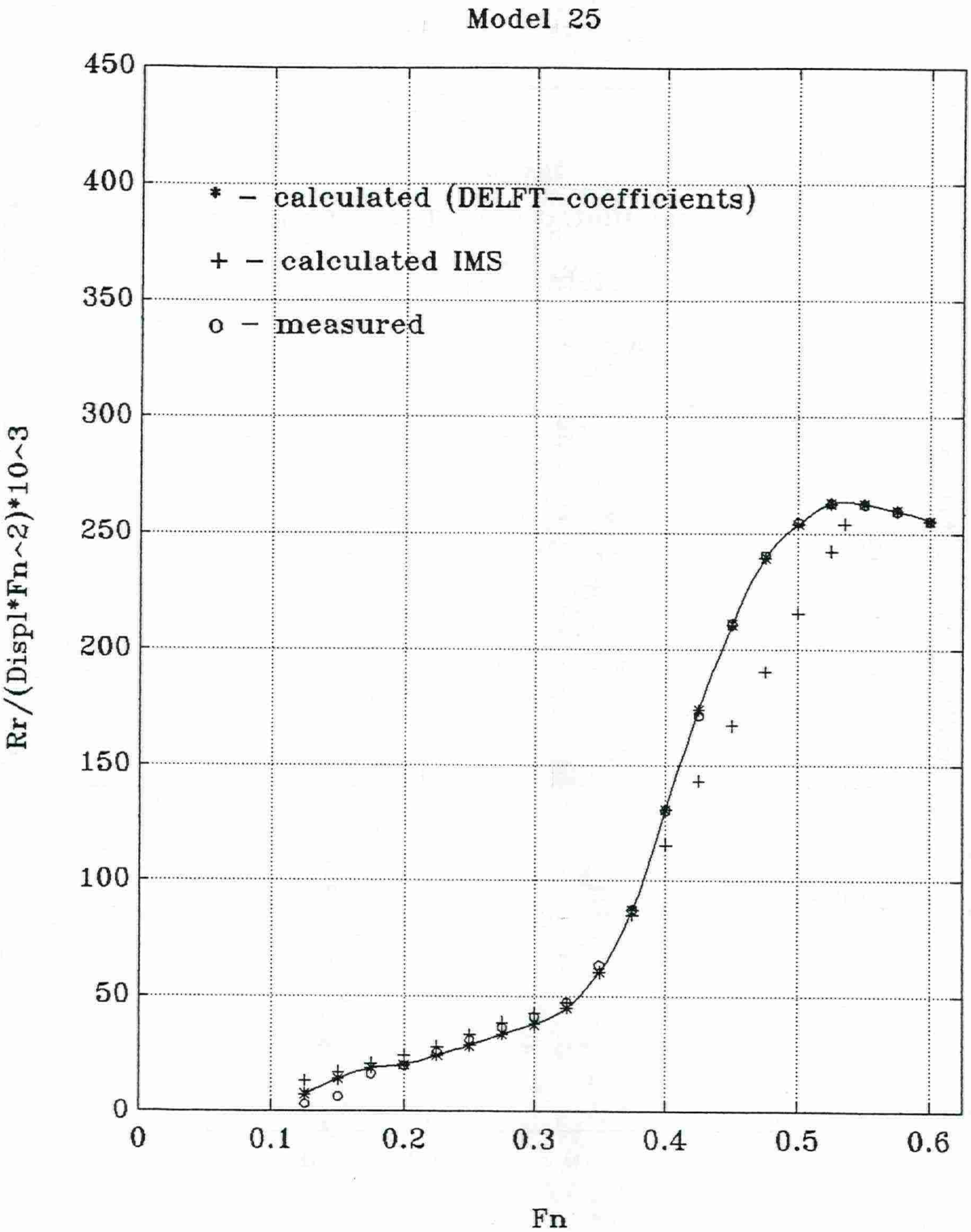
450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn


Model 28
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 23
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

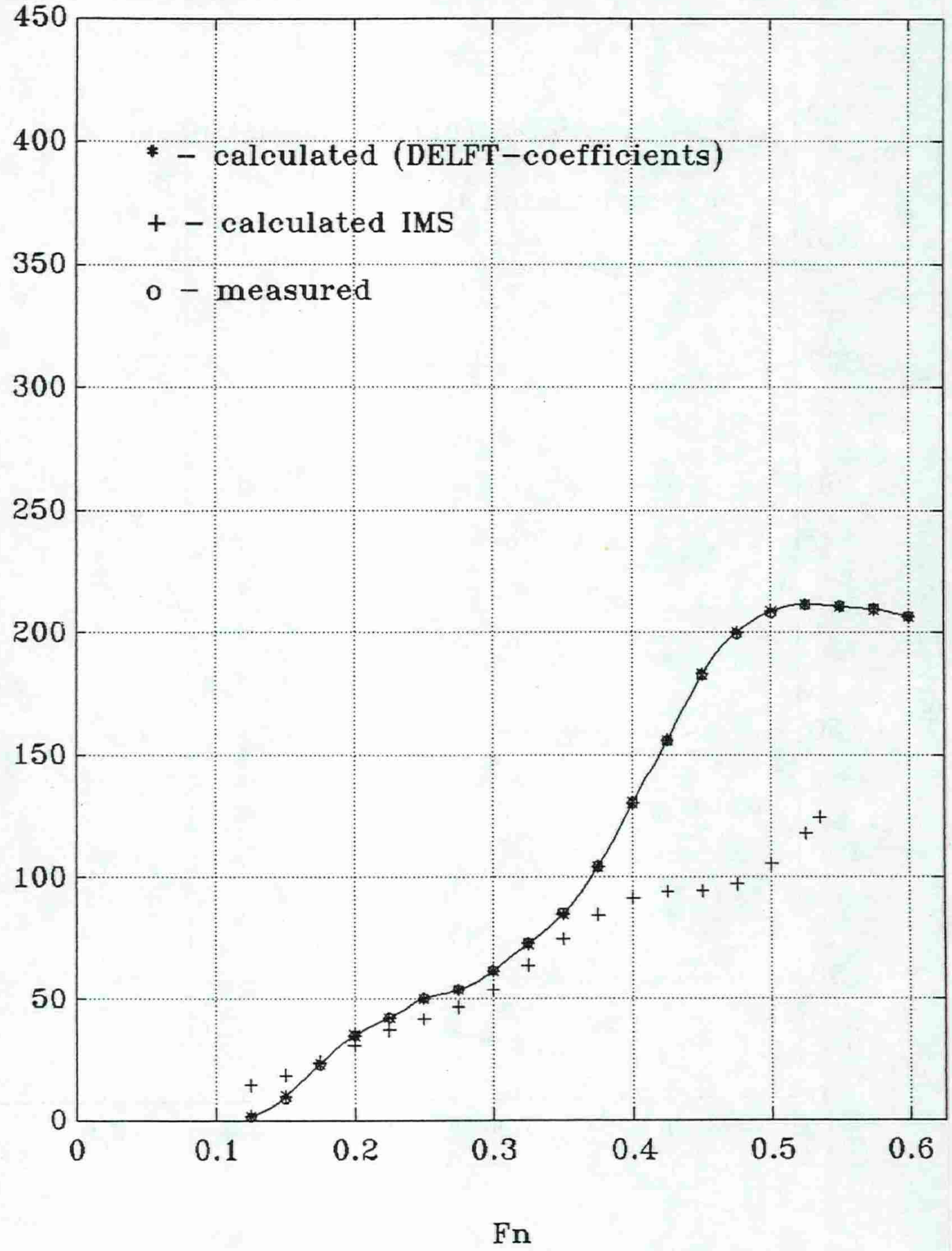


Model 24
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

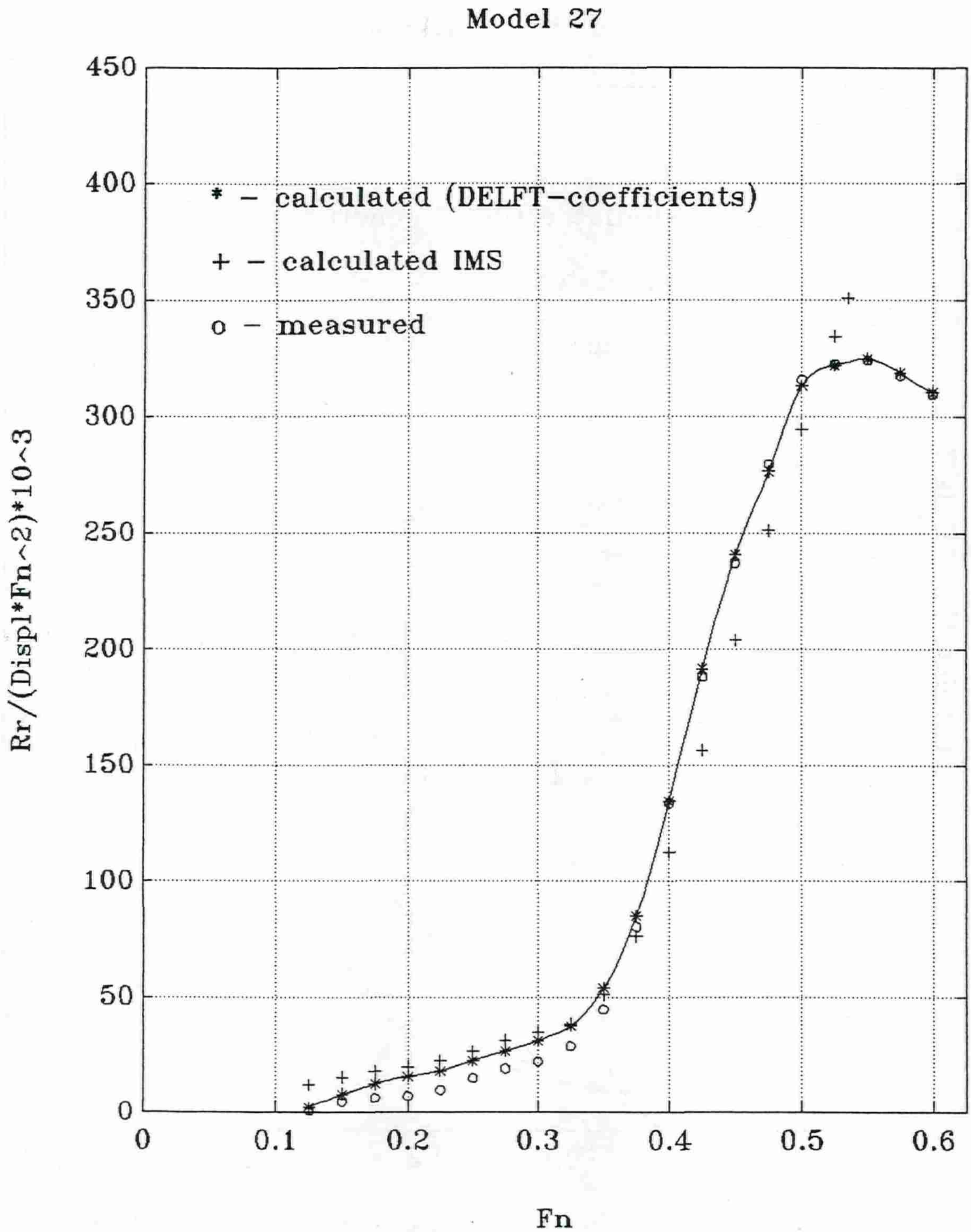


Model 25
* – calculated (DELFT-coefficients)
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

Model 26

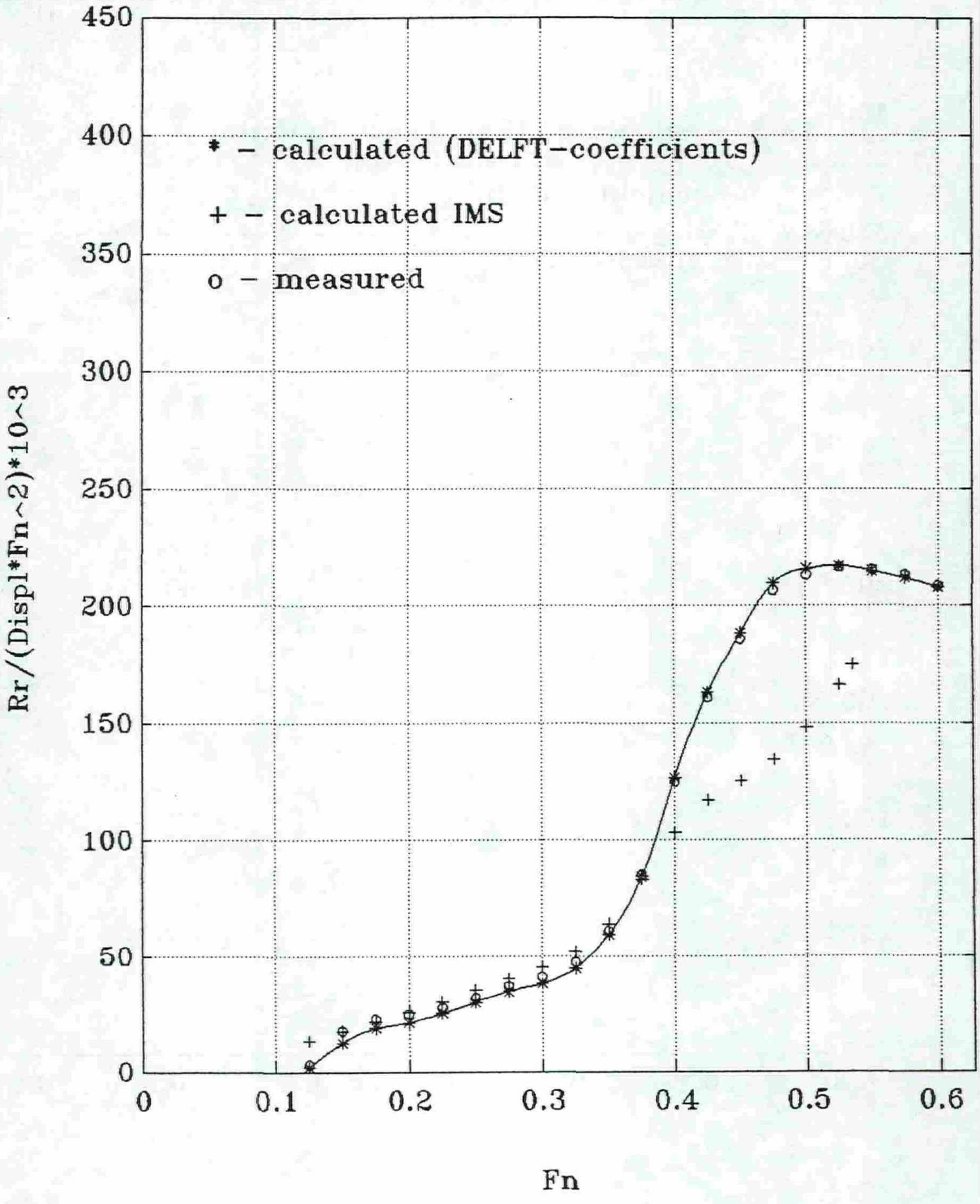


* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

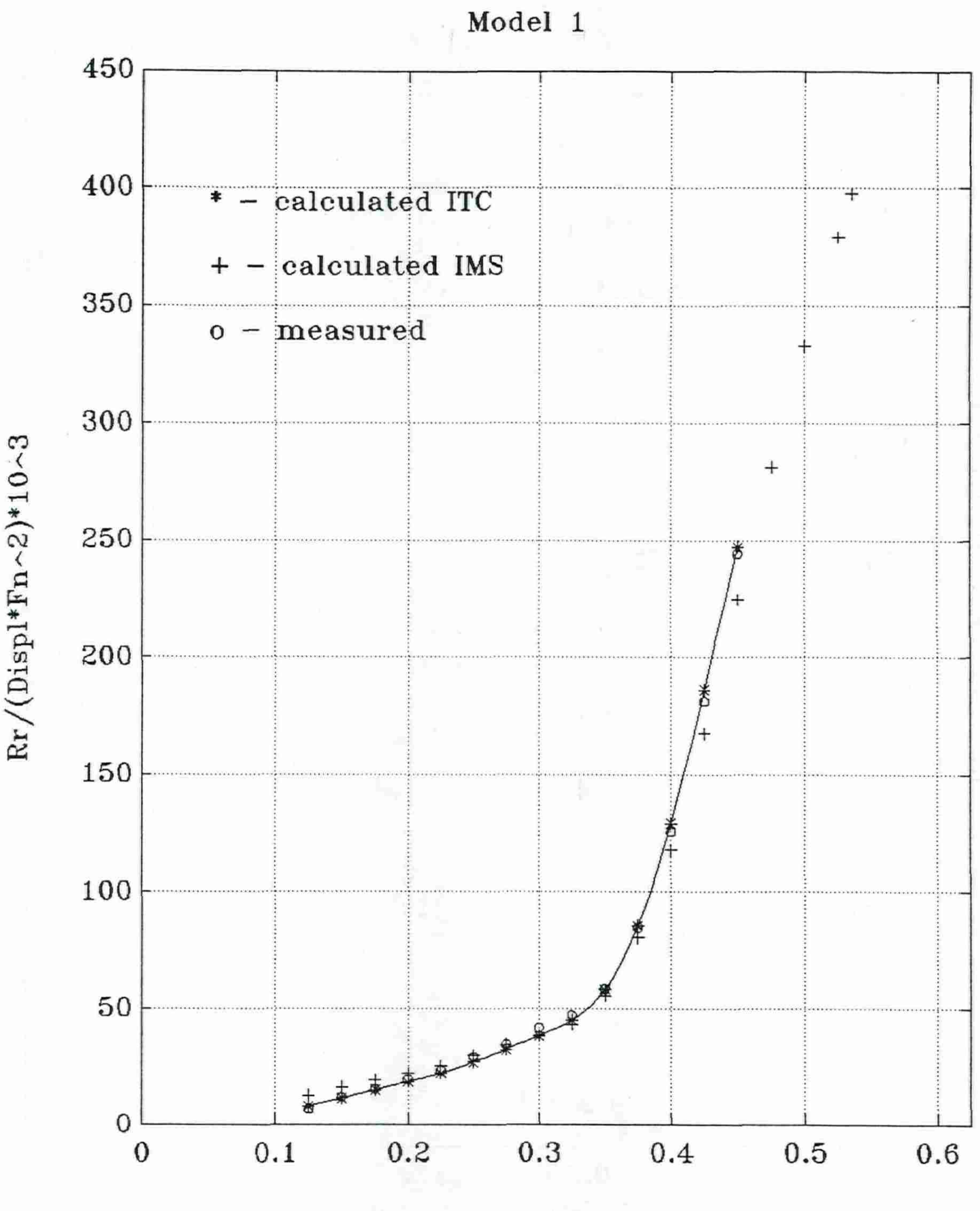


Model 27
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

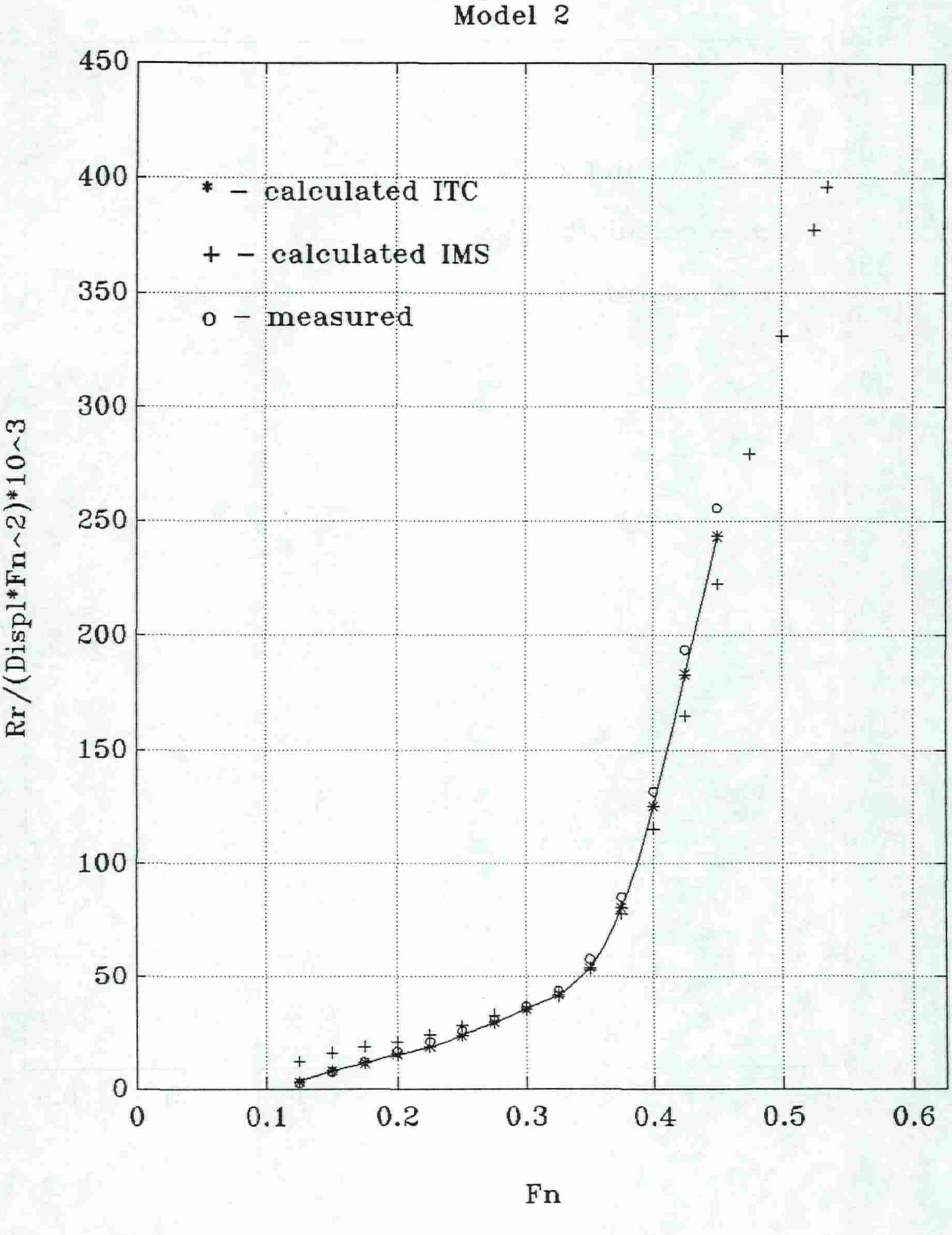
Model 28



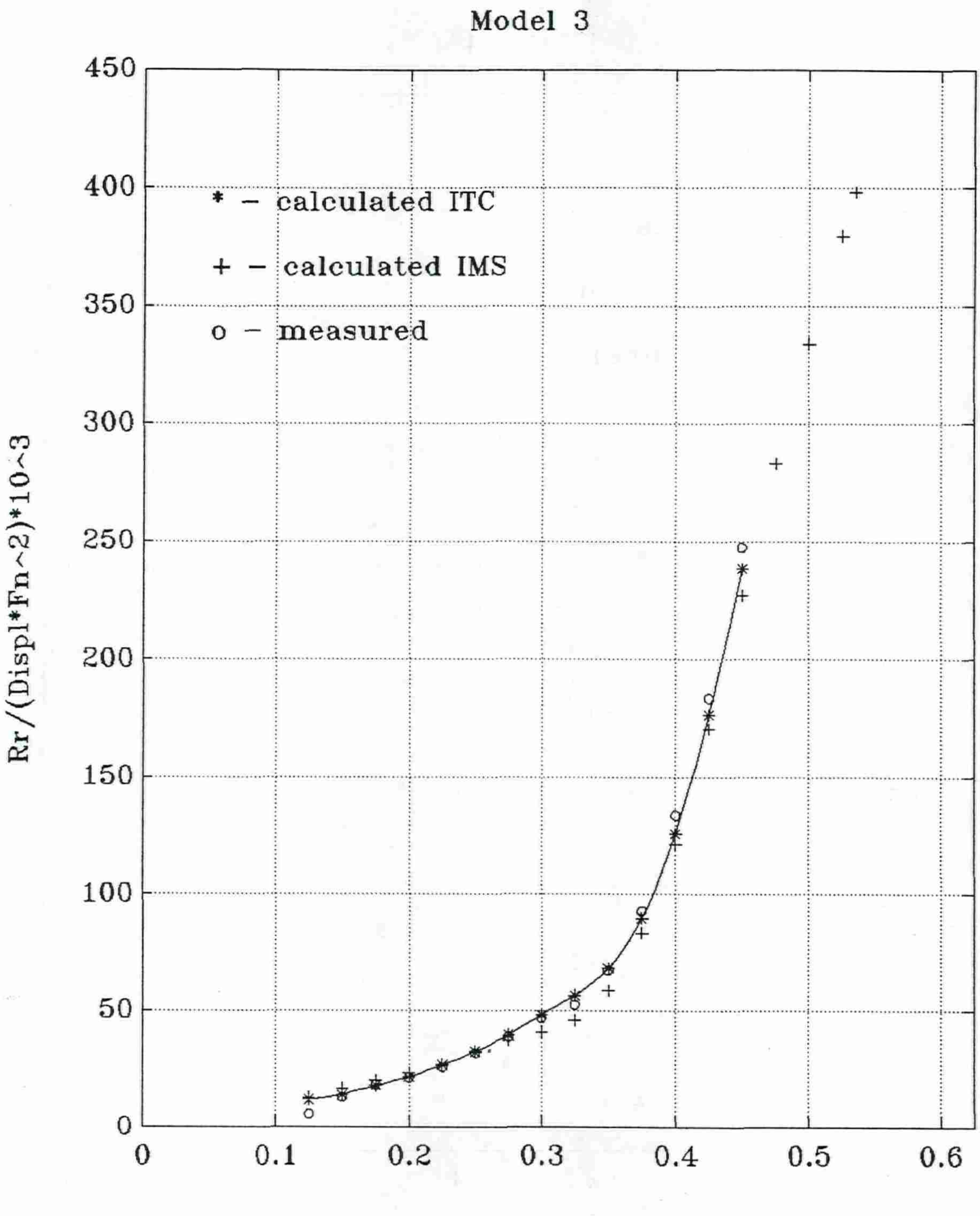
* - calculated (DELFT-coefficients)
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn



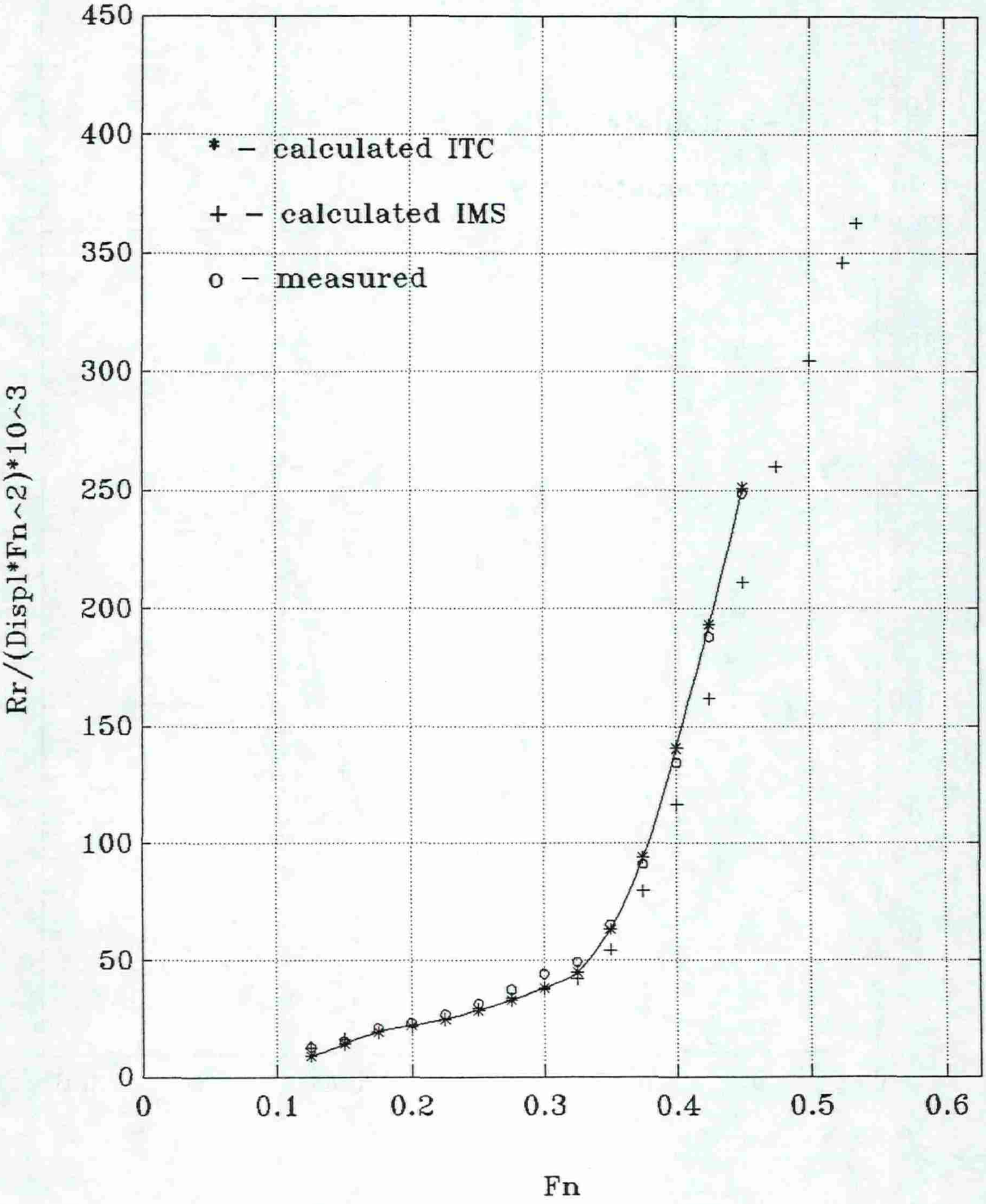
Model 1
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn



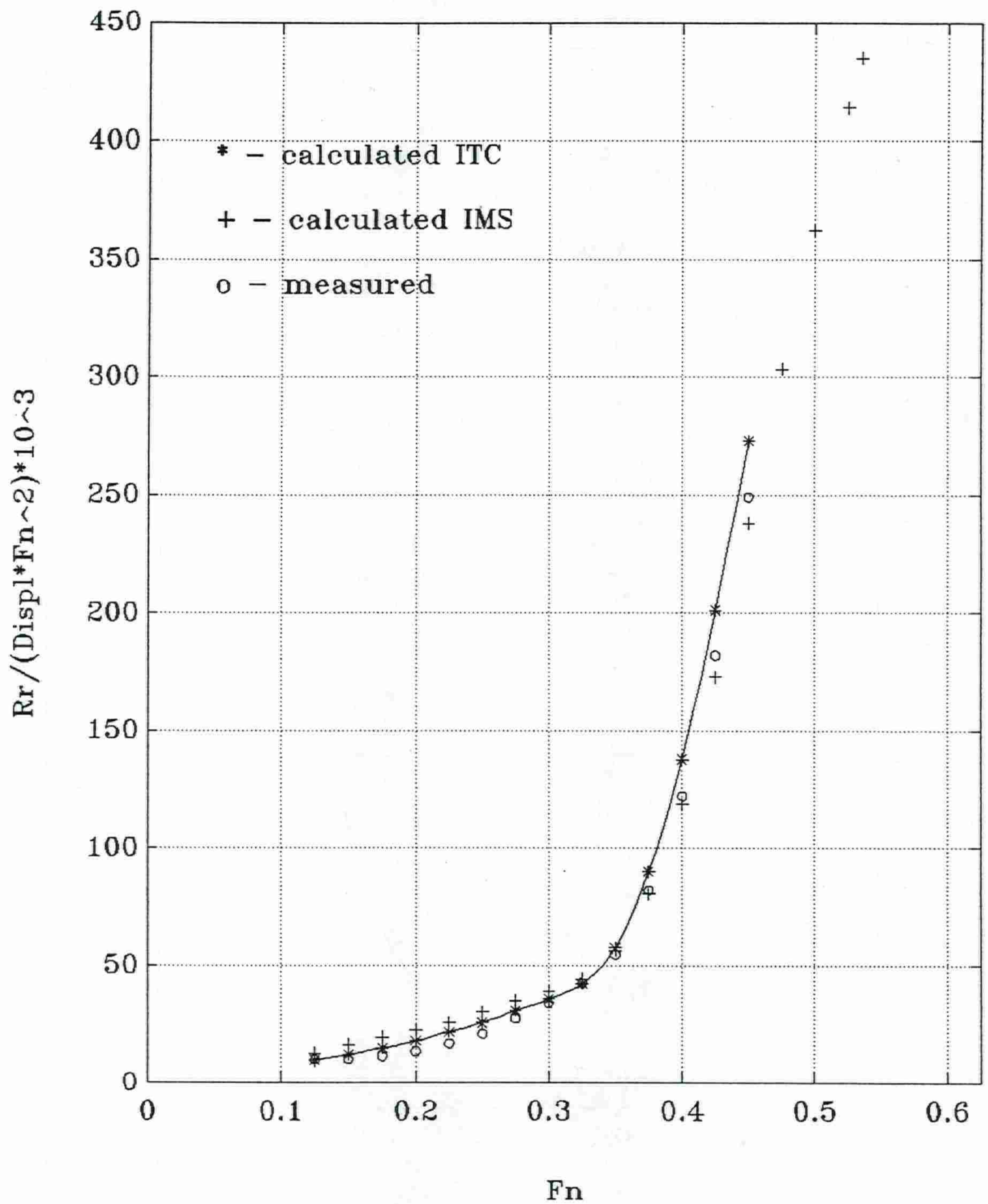
Model 2
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

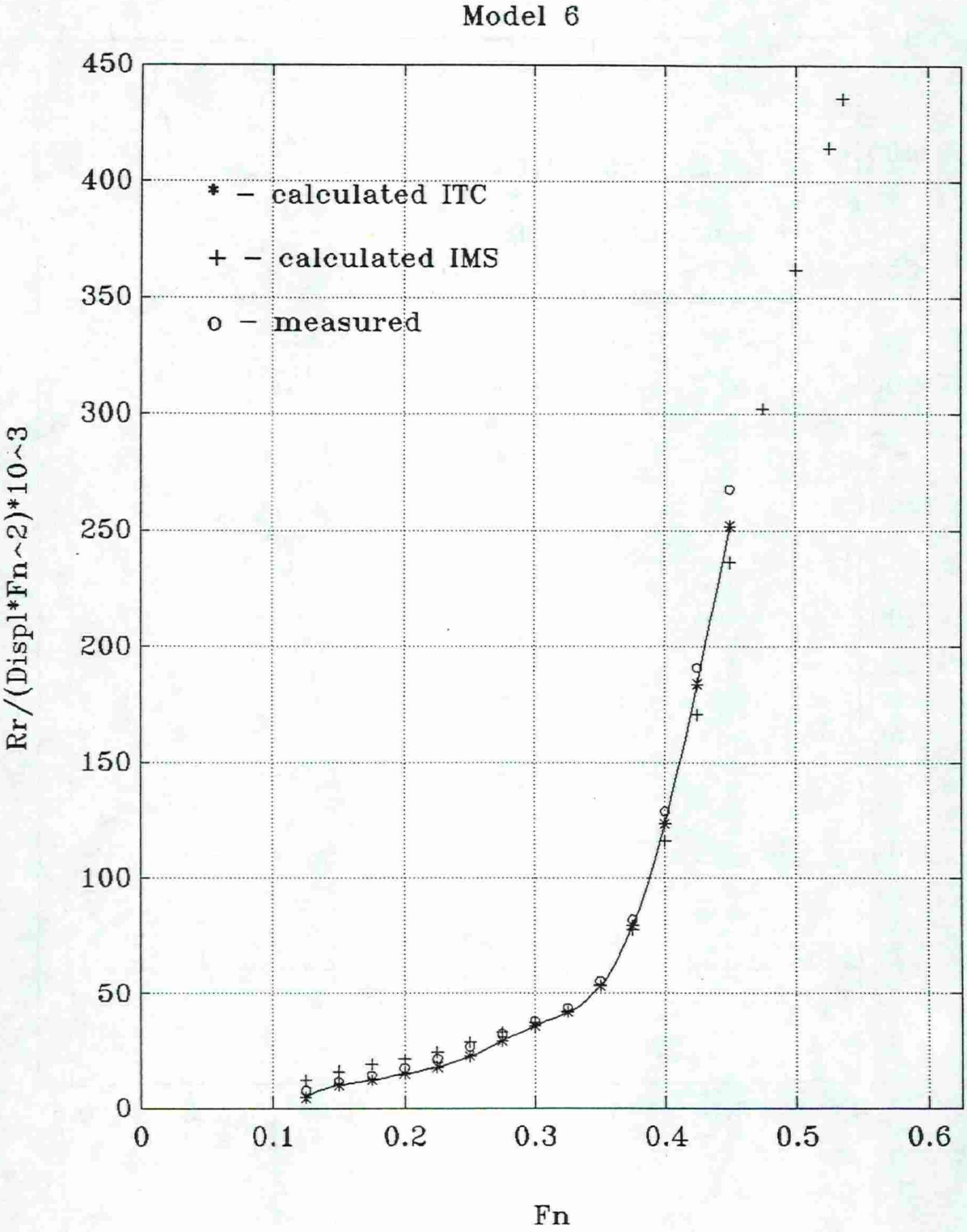

Model 3
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

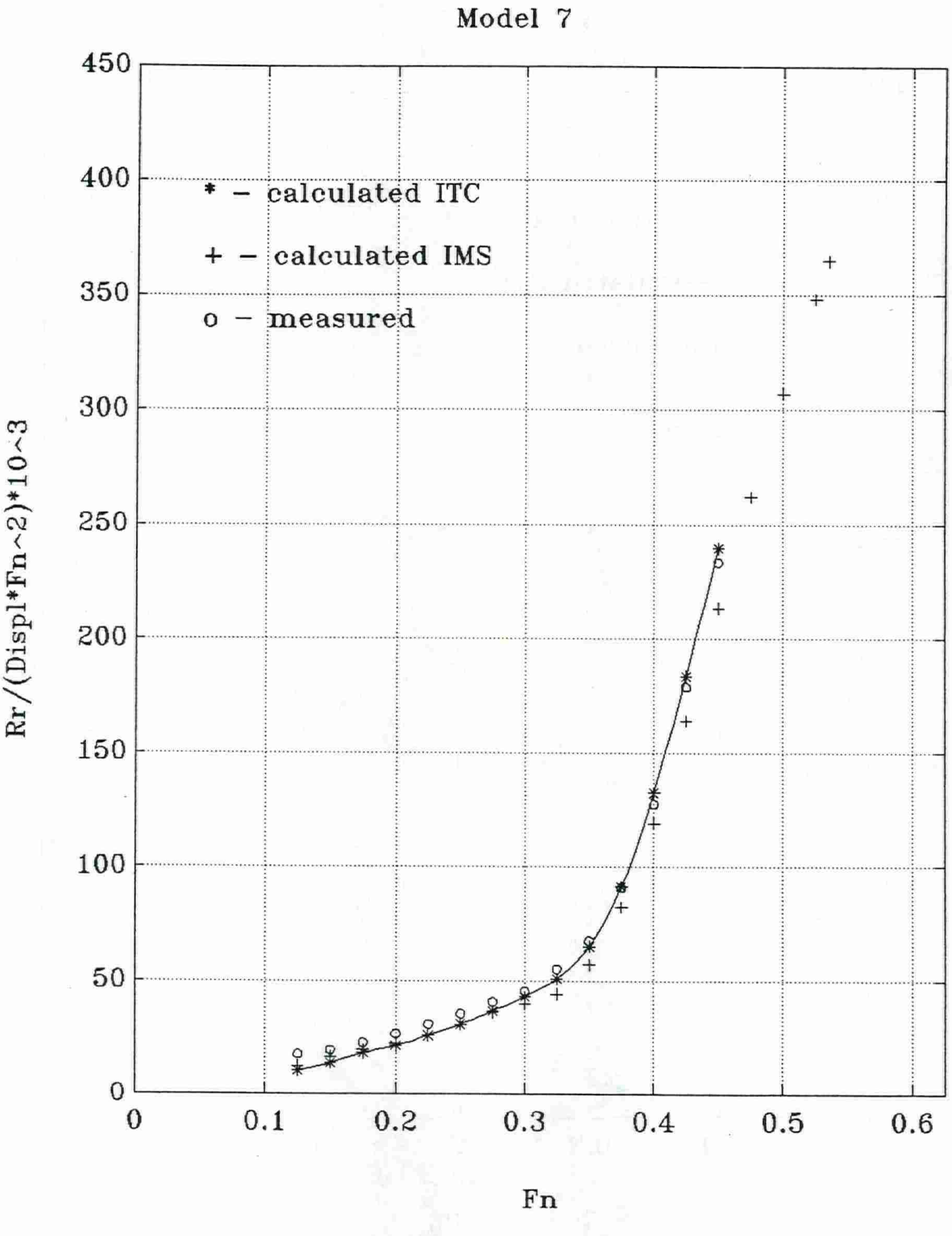
Model 4

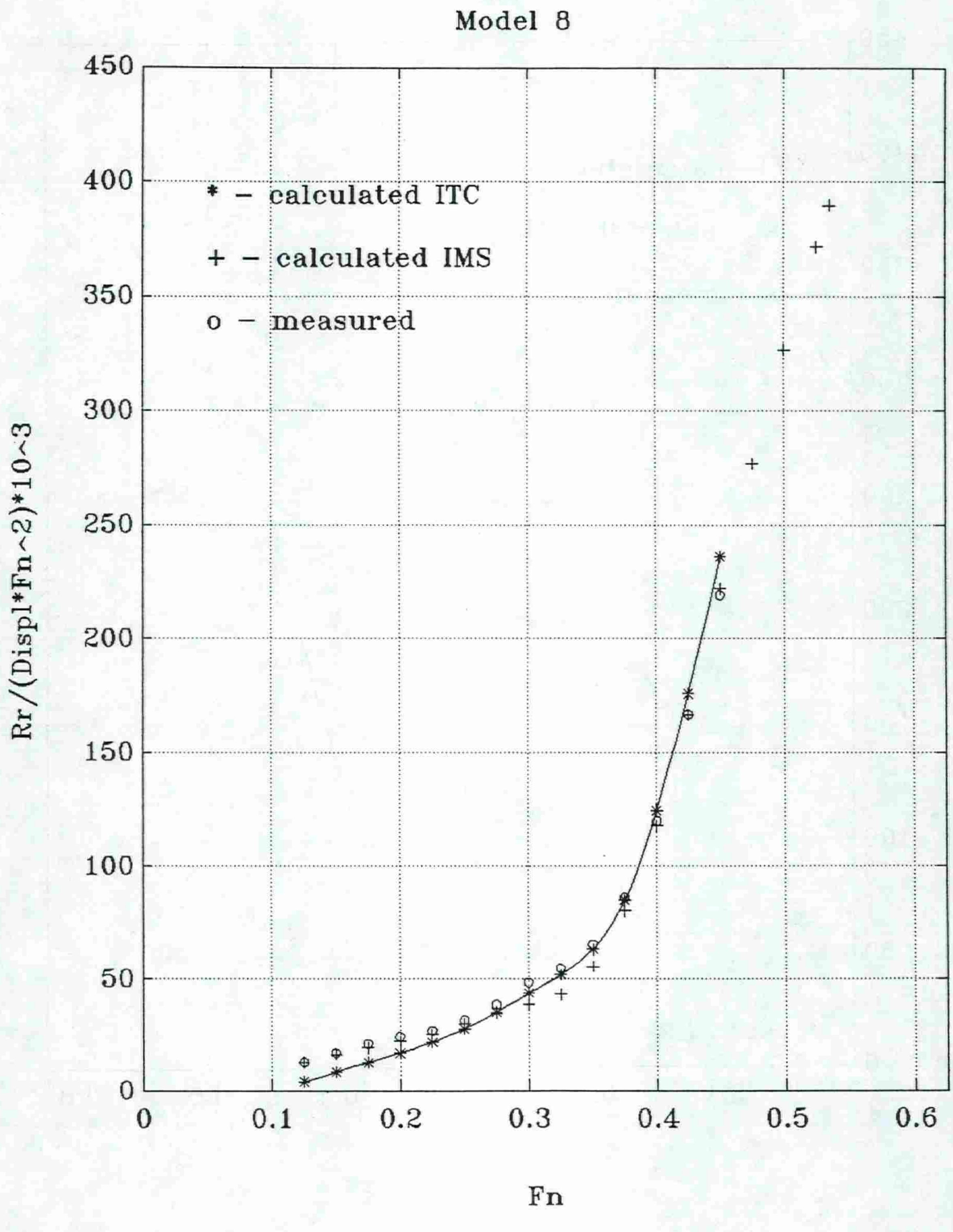

450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* – calculated ITC
+ – calculated IMS
o – measured
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

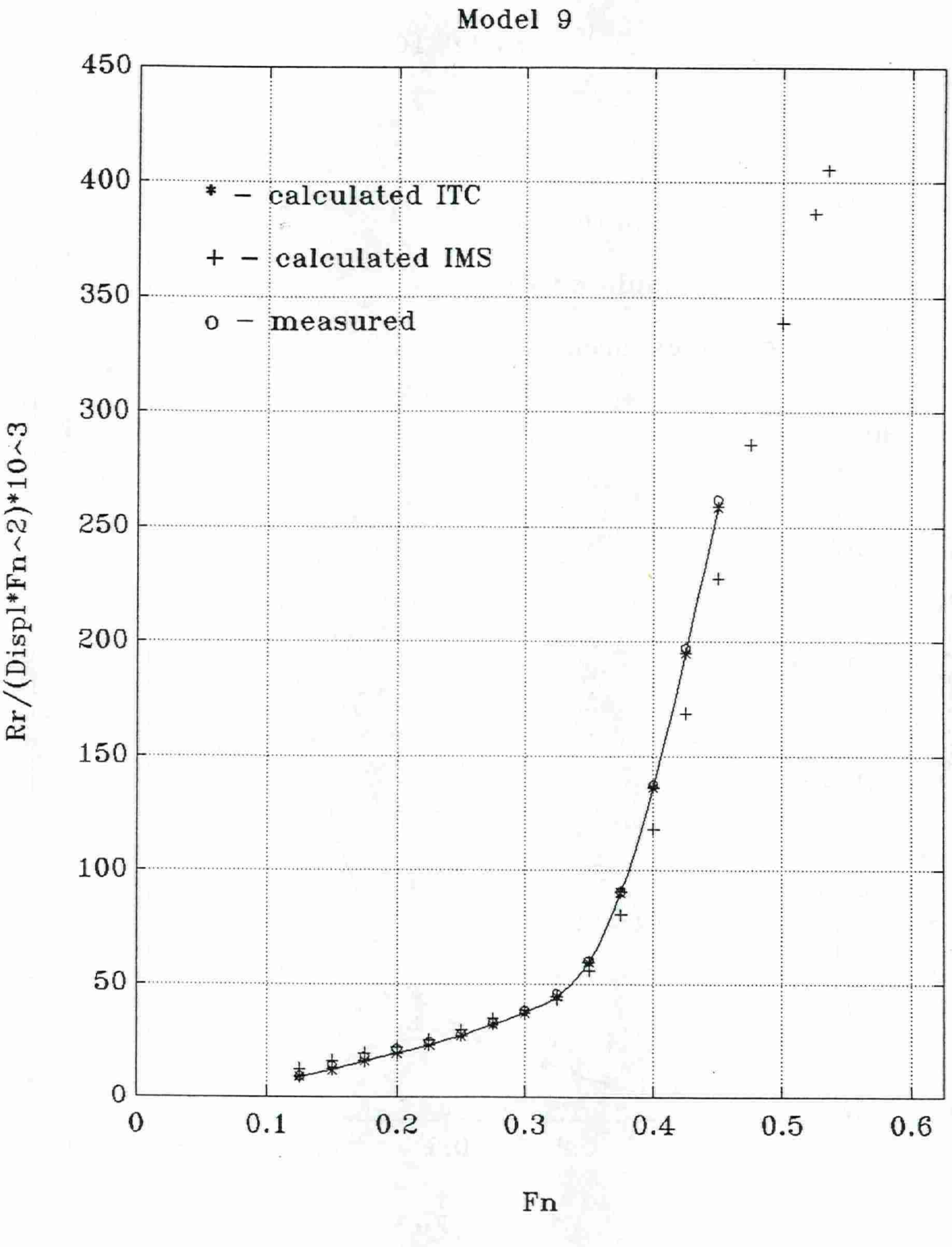
Model 5


Rr/(Displ*Fn^2)*10^3
Fn
* – calculated ITC
+ – calculated IMS
o – measured
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

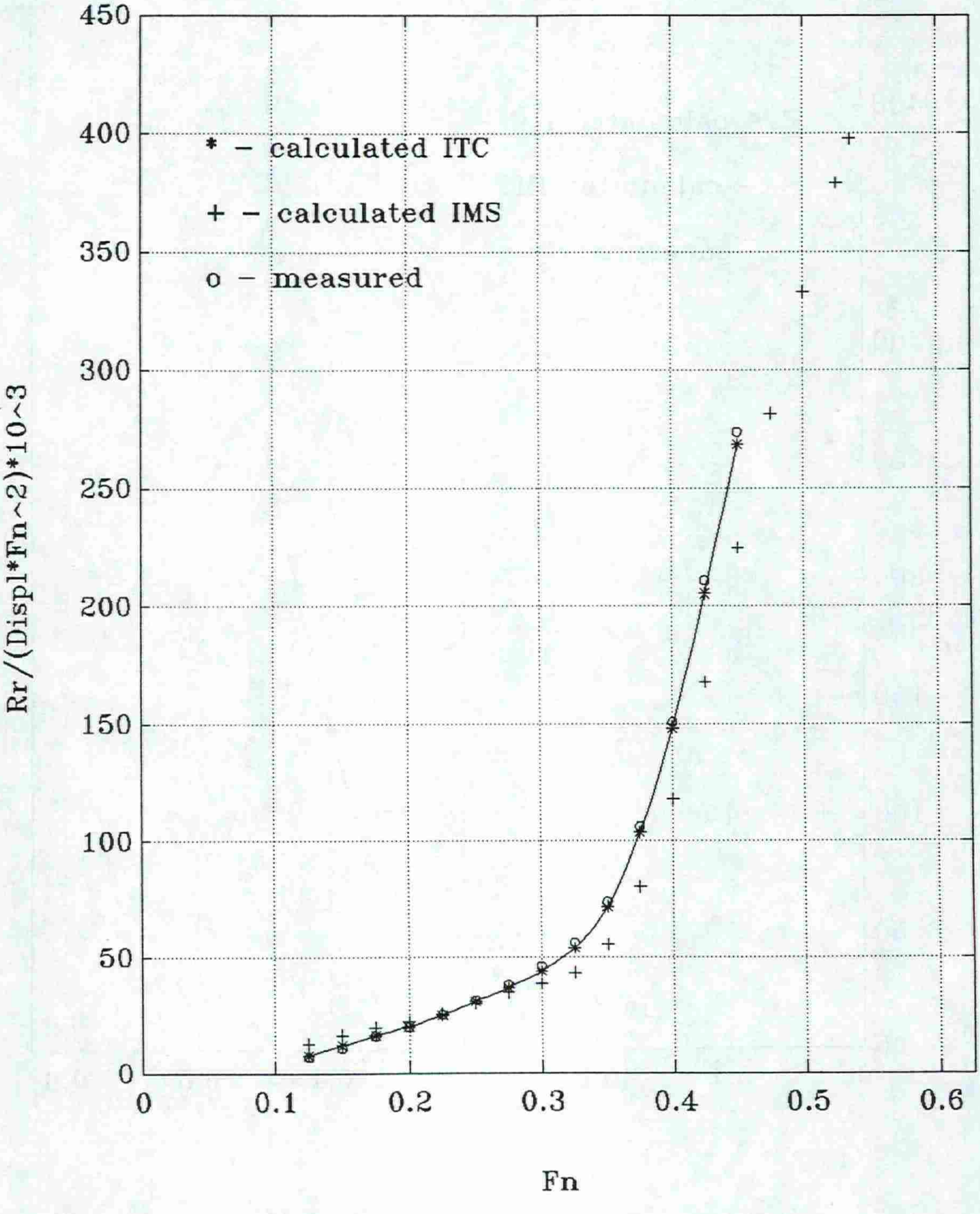

Model 6
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

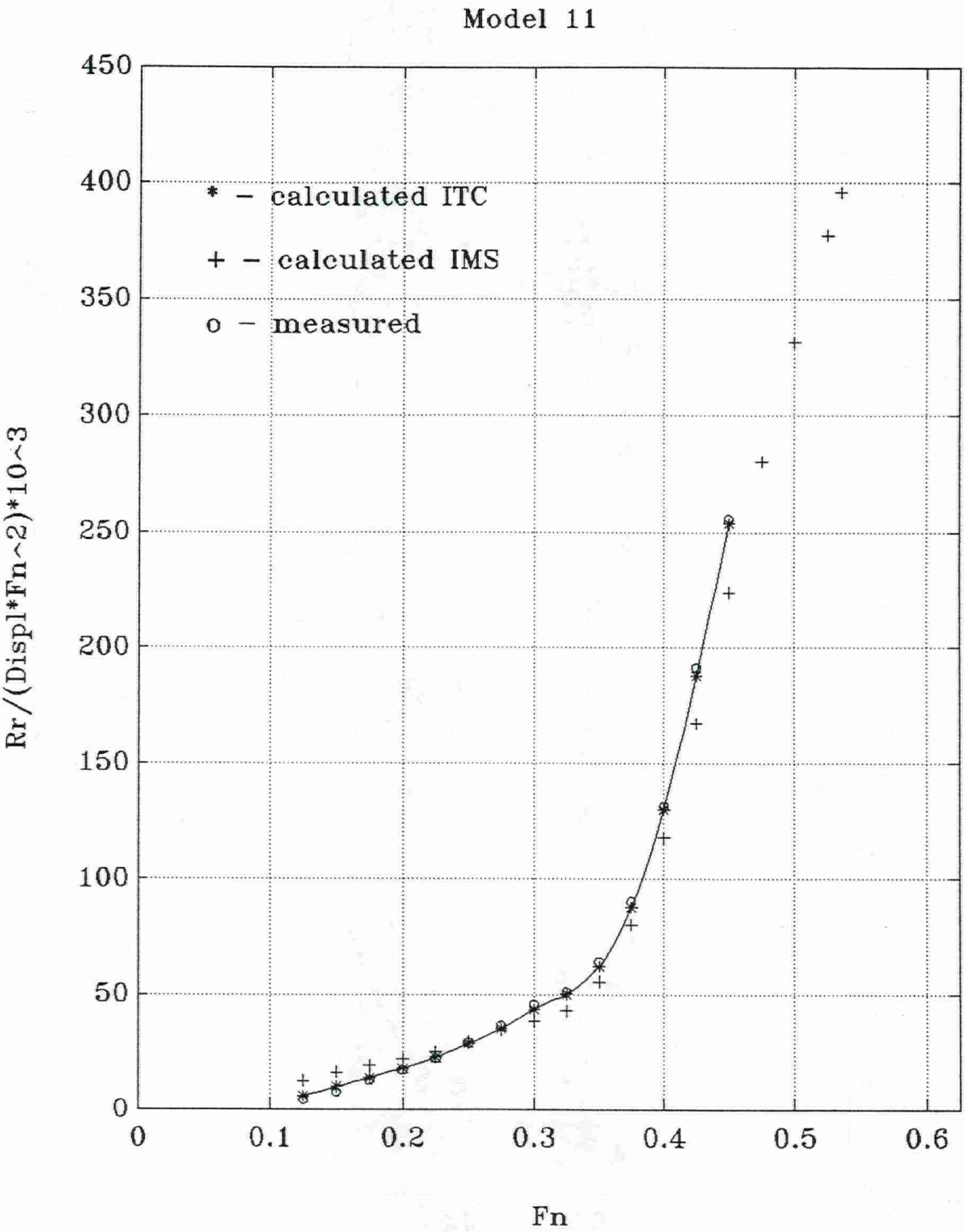

Model 7
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn


Model 8
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

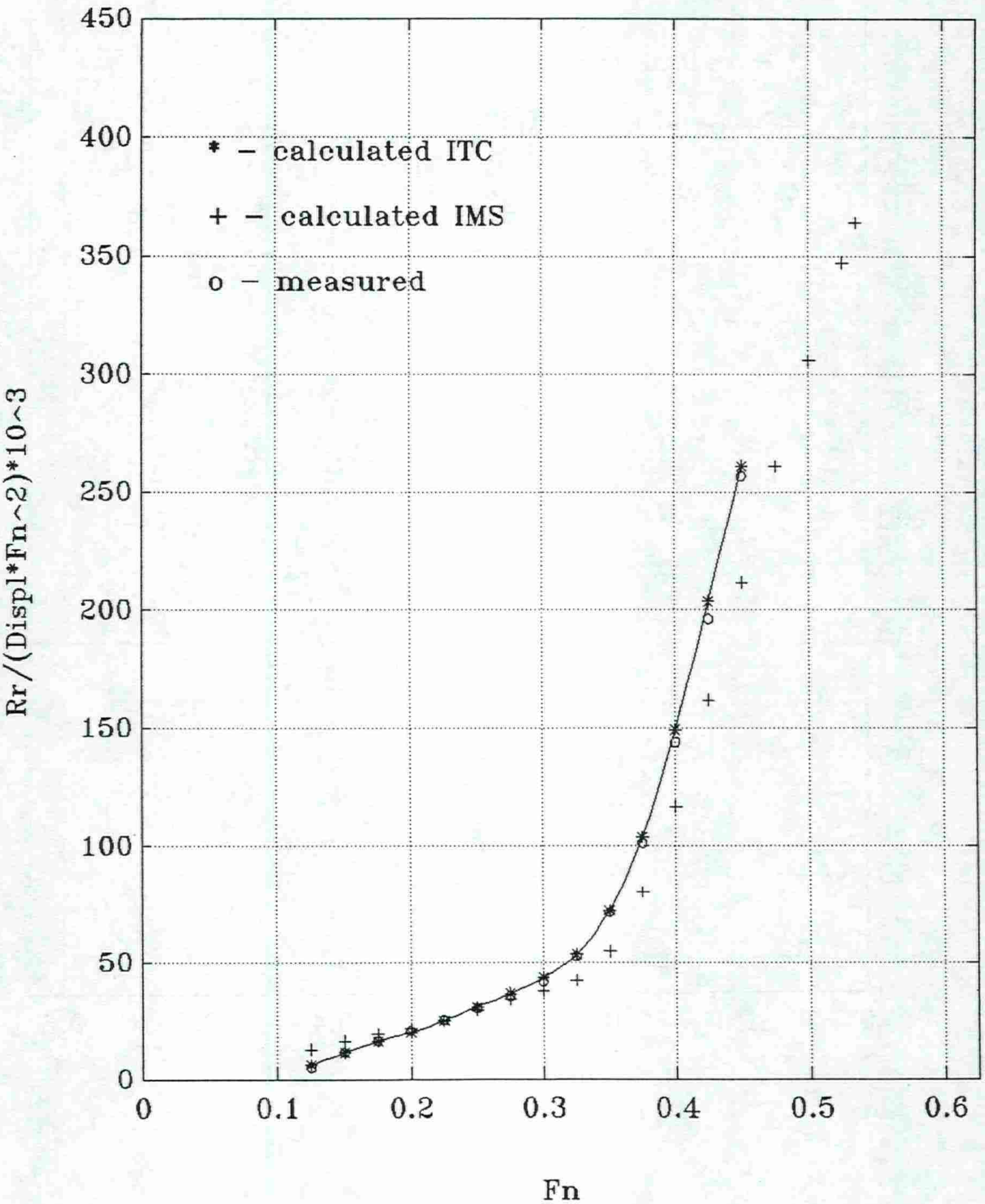

Model 9
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

Model 10

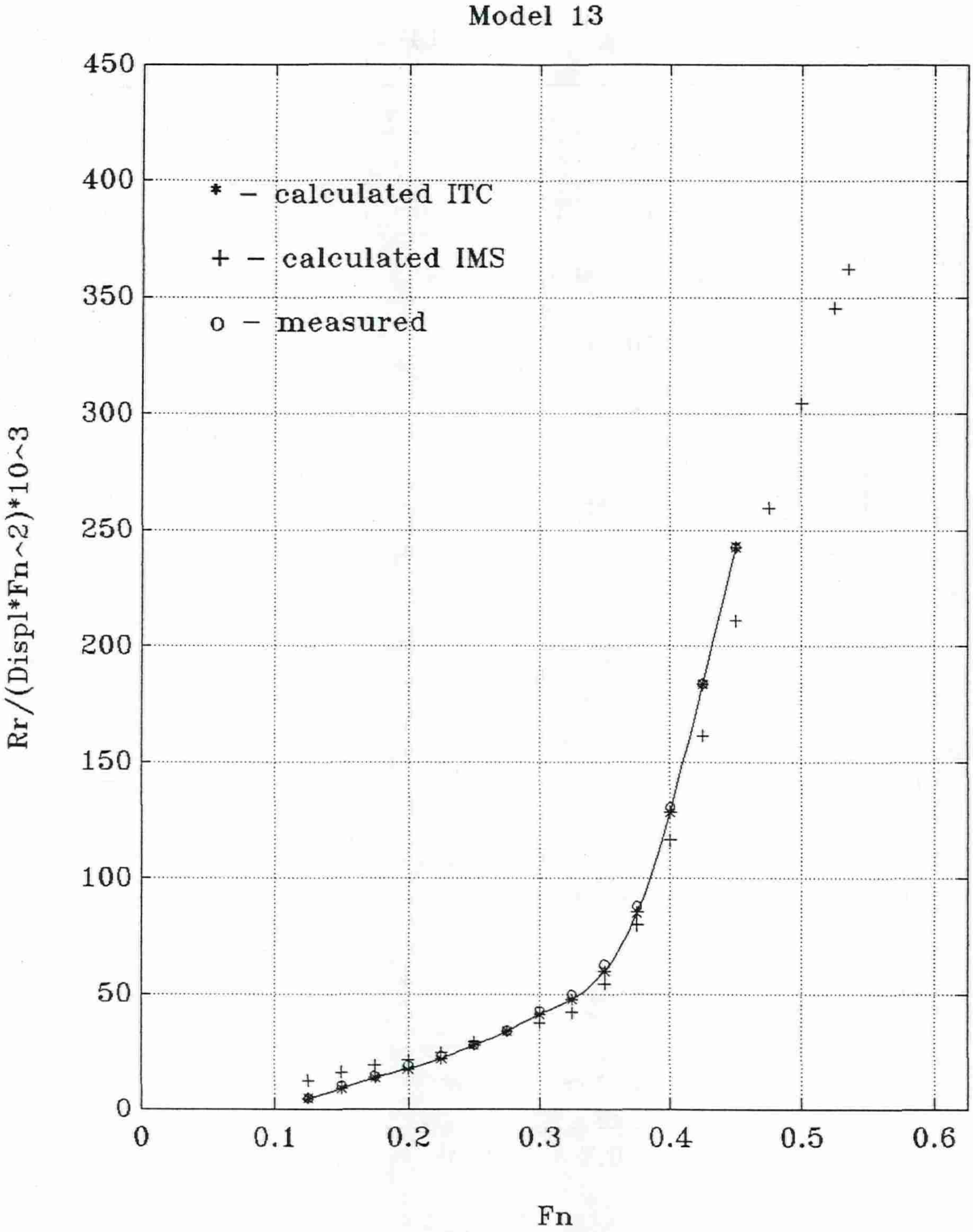

* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 11
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

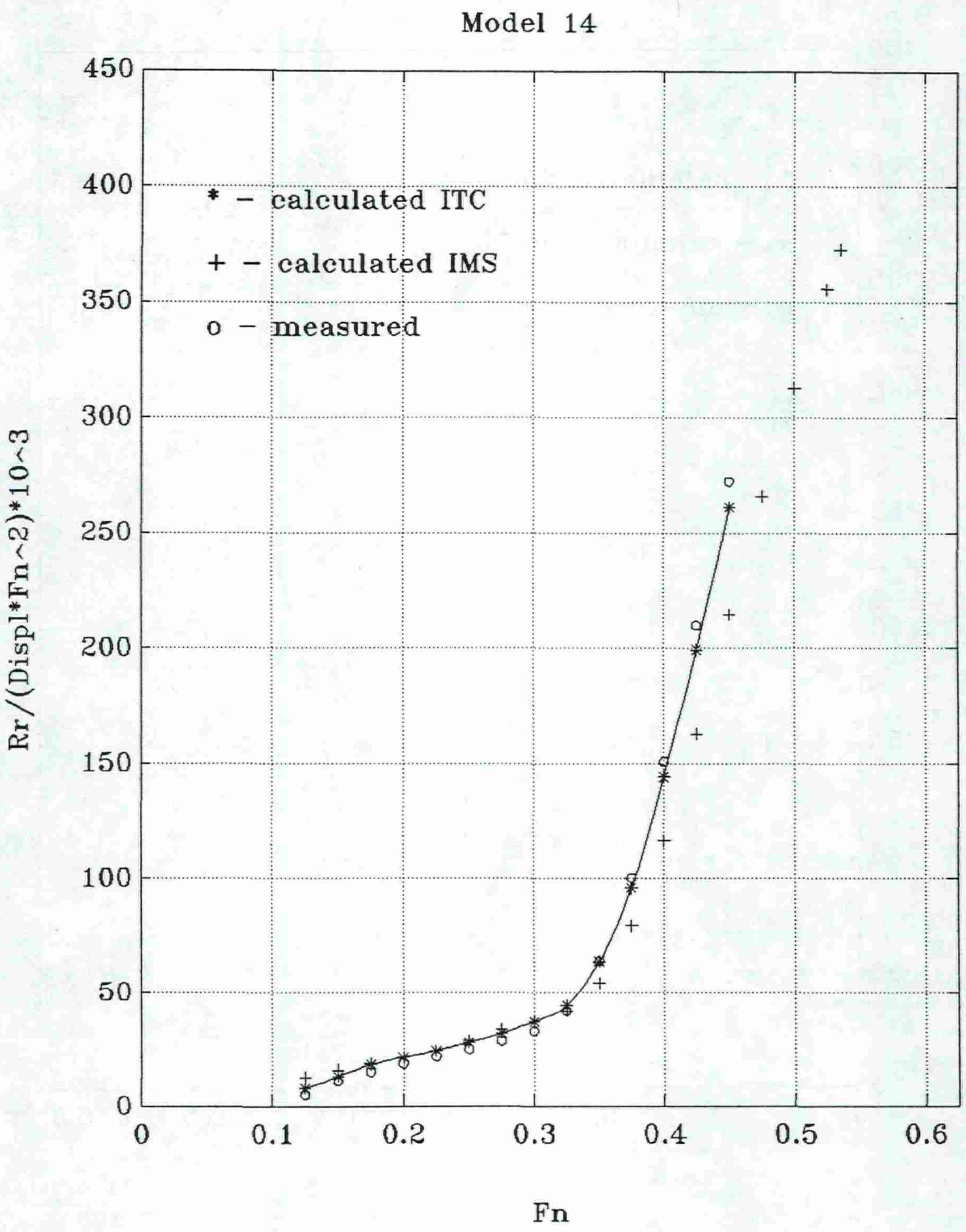
Model 12



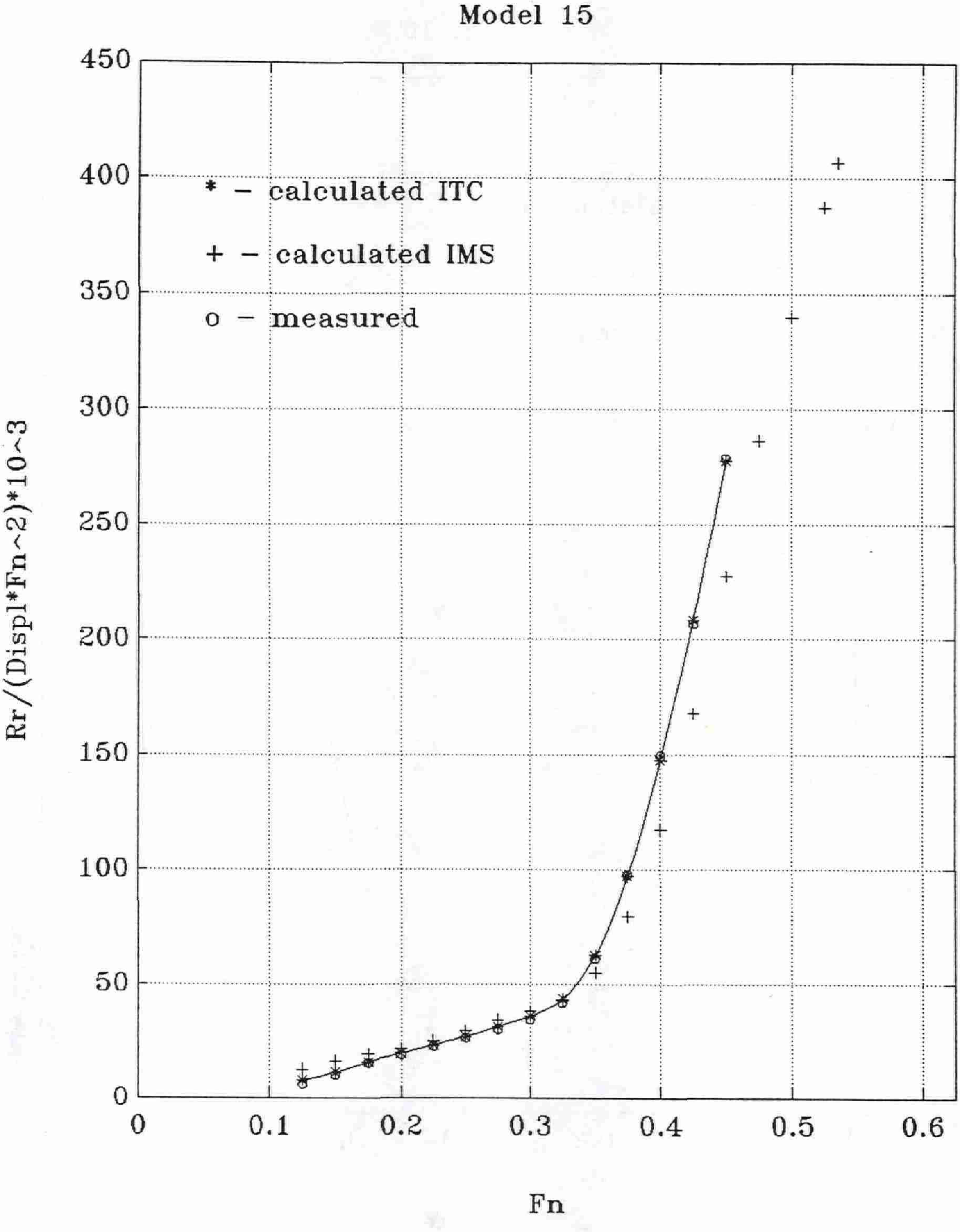
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

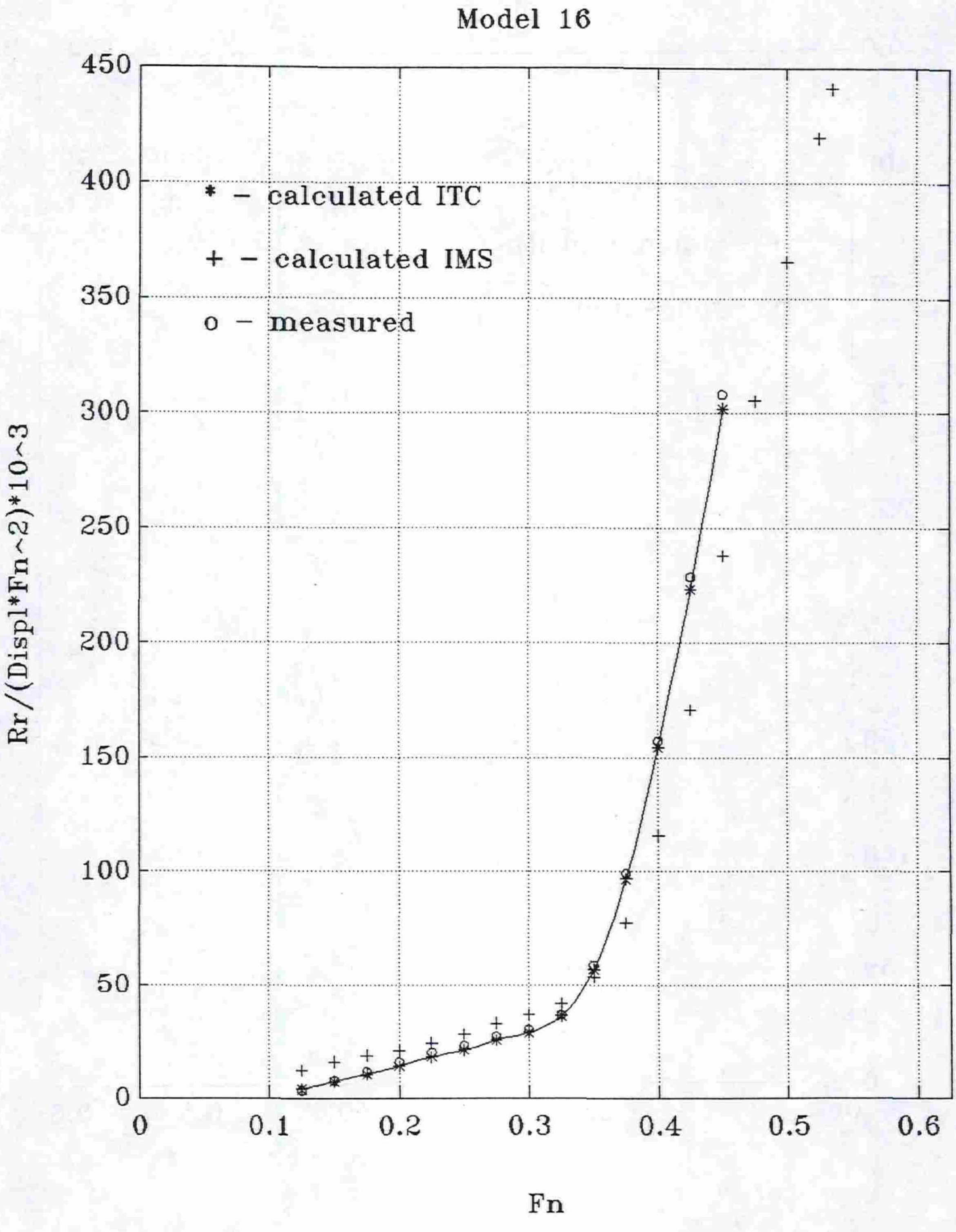


Model 13
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

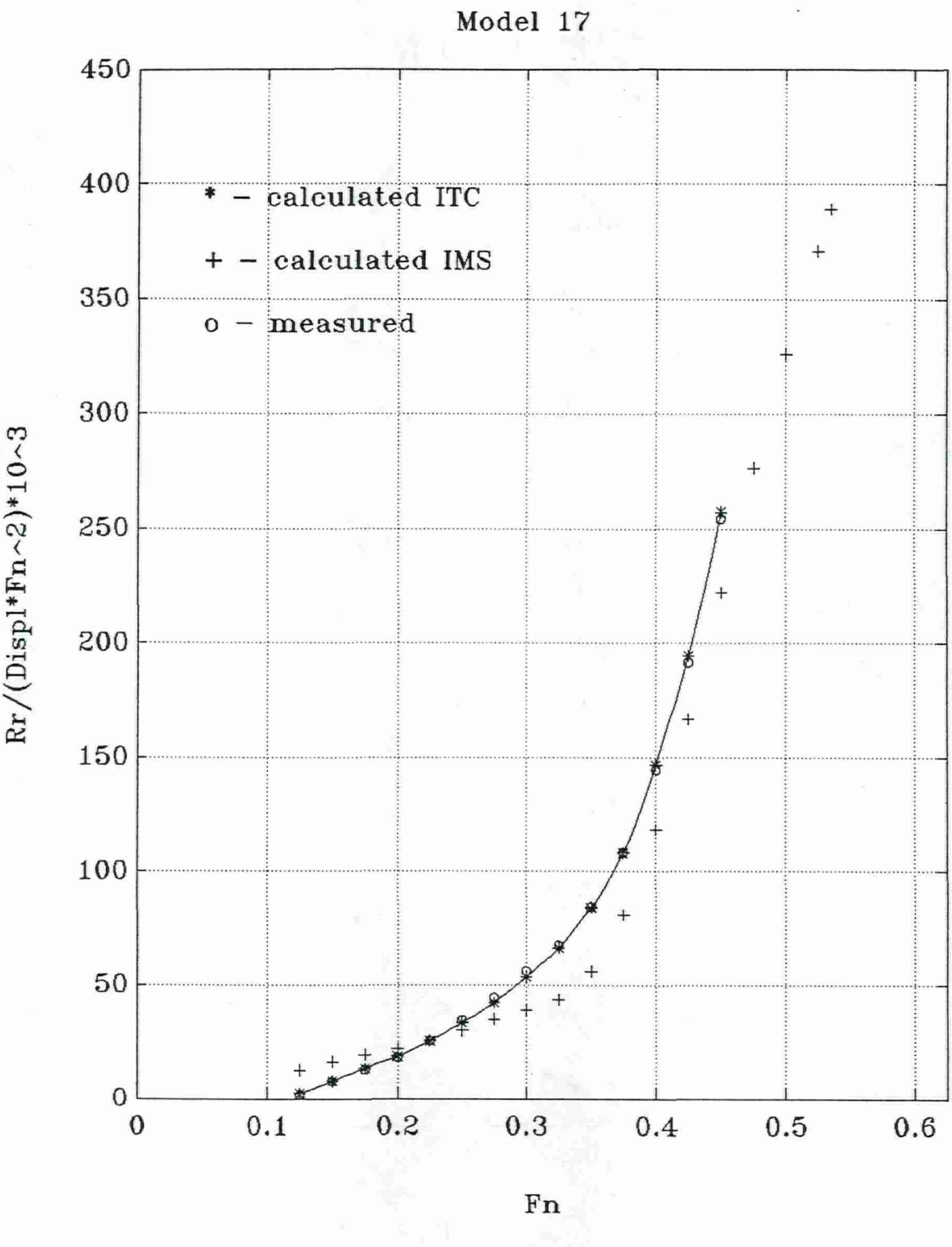


Model 14
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

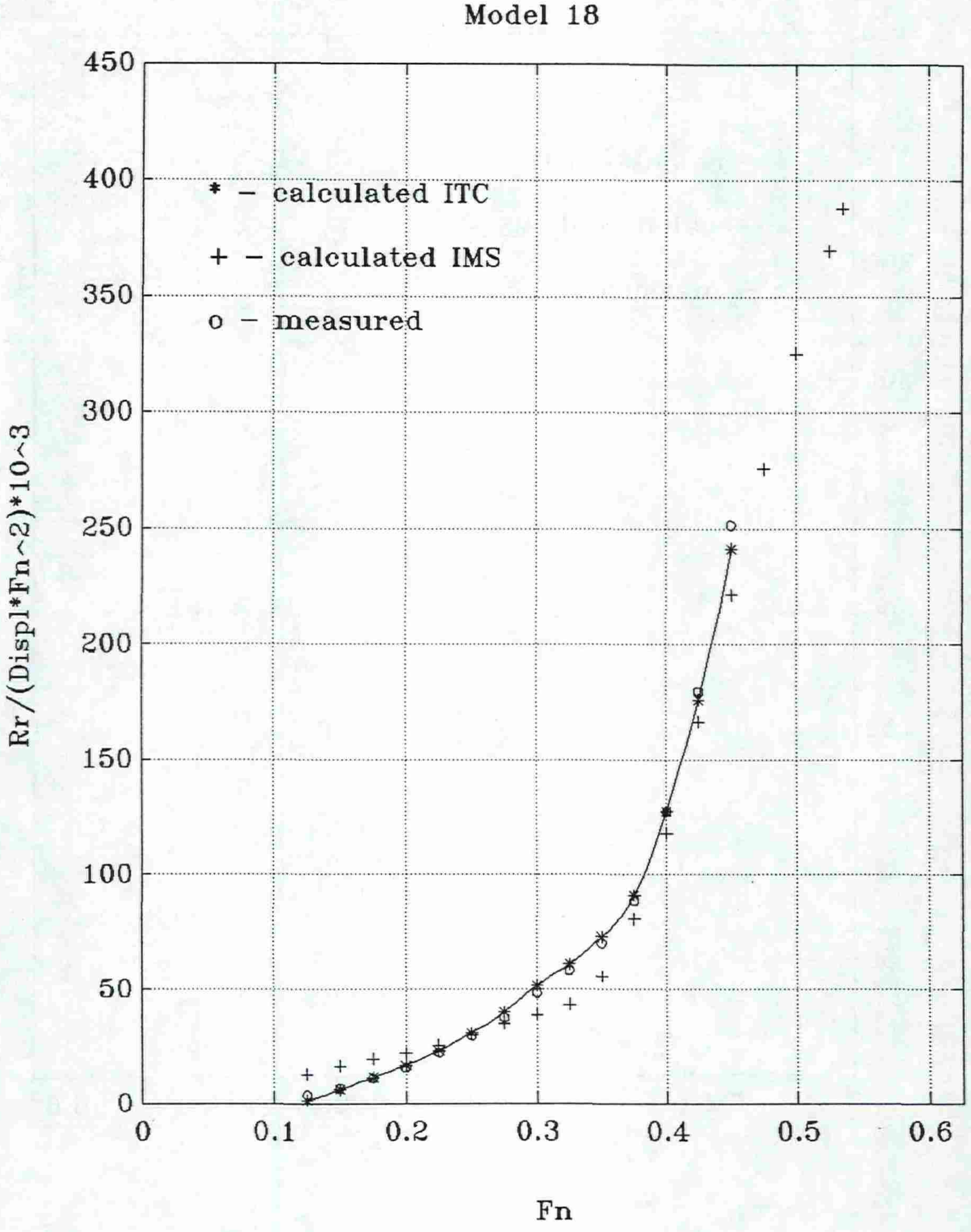

Model 15
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6



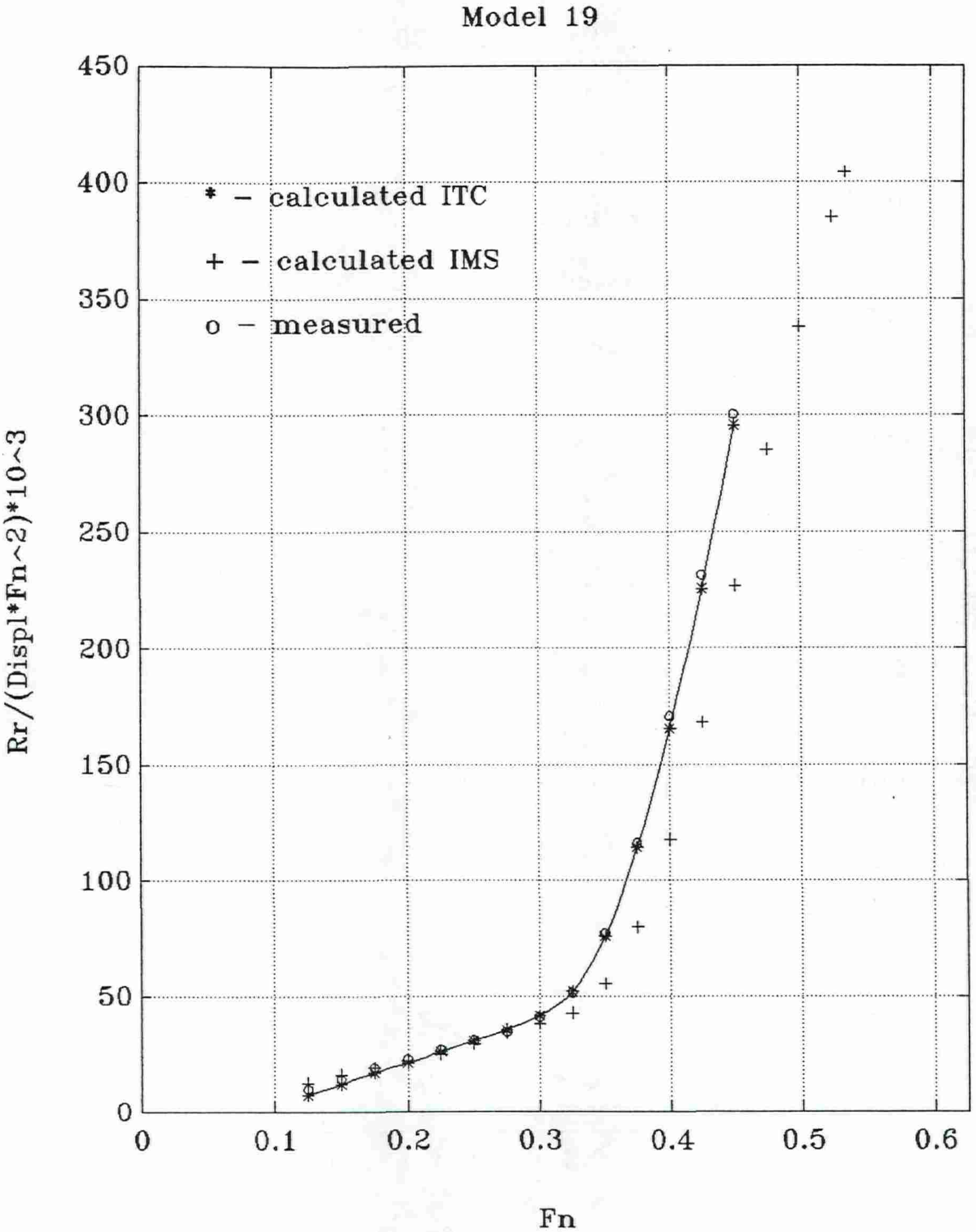
Model 16
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6



Model 17
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

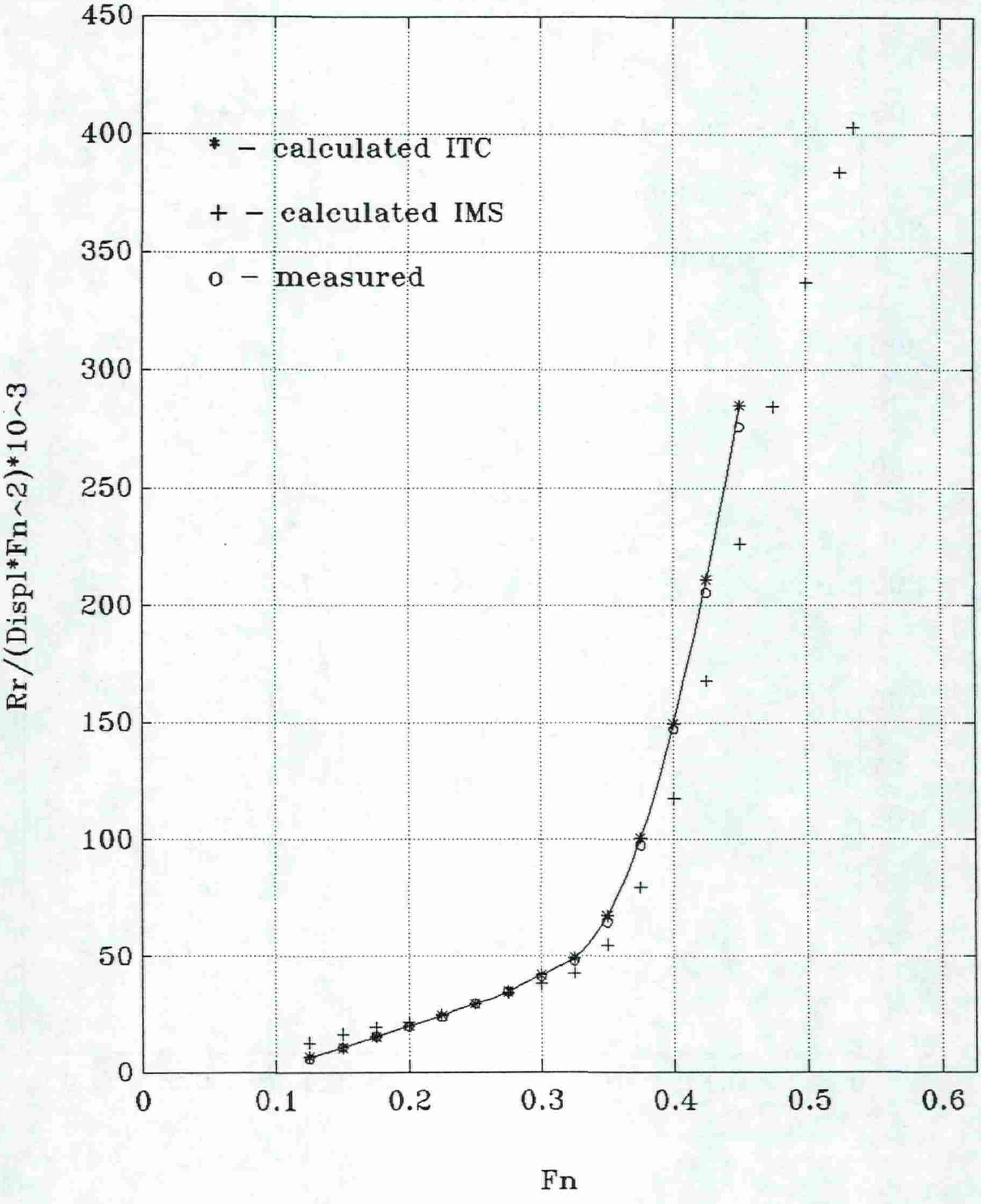


Model 18
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6



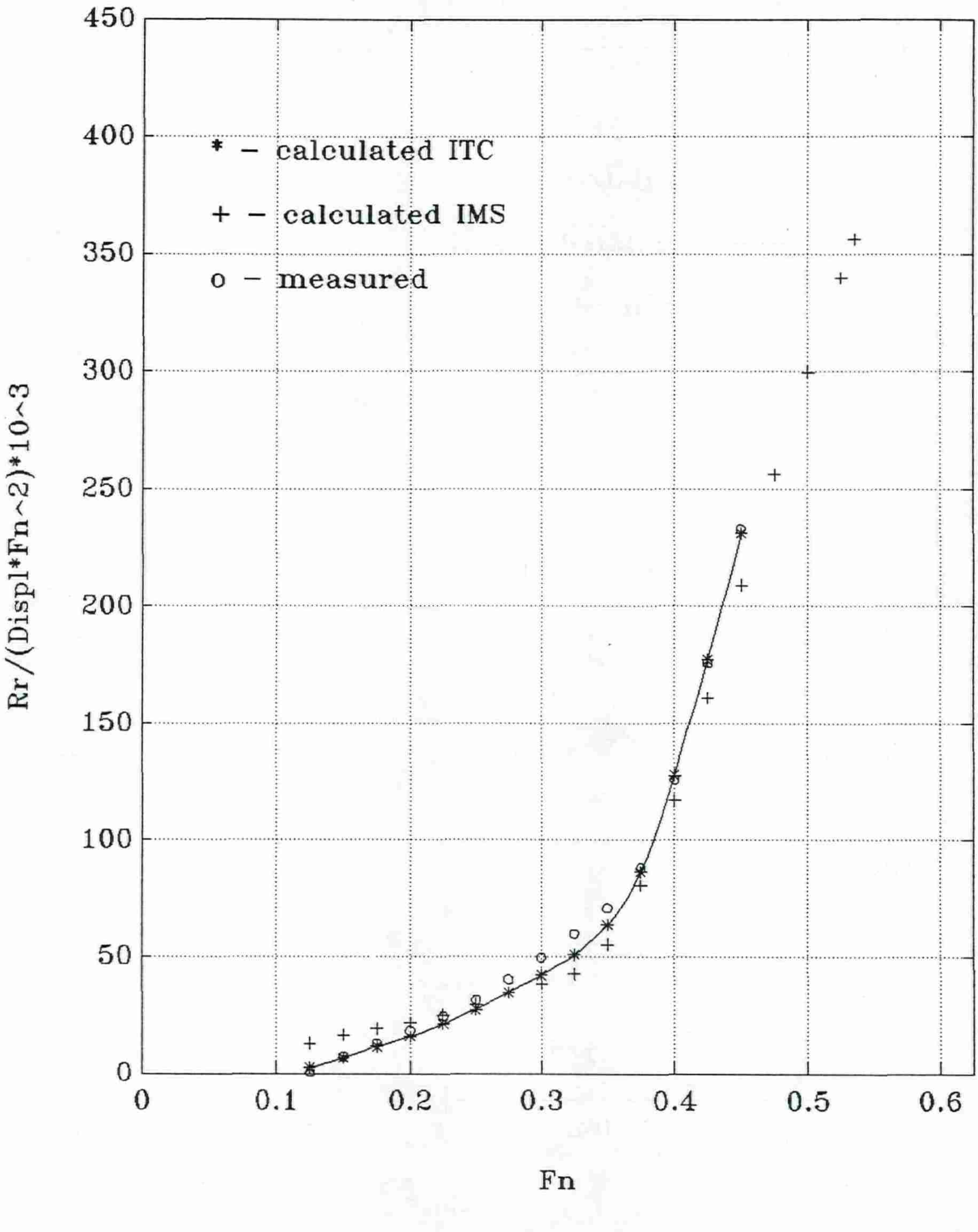
Model 19
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

Model 20

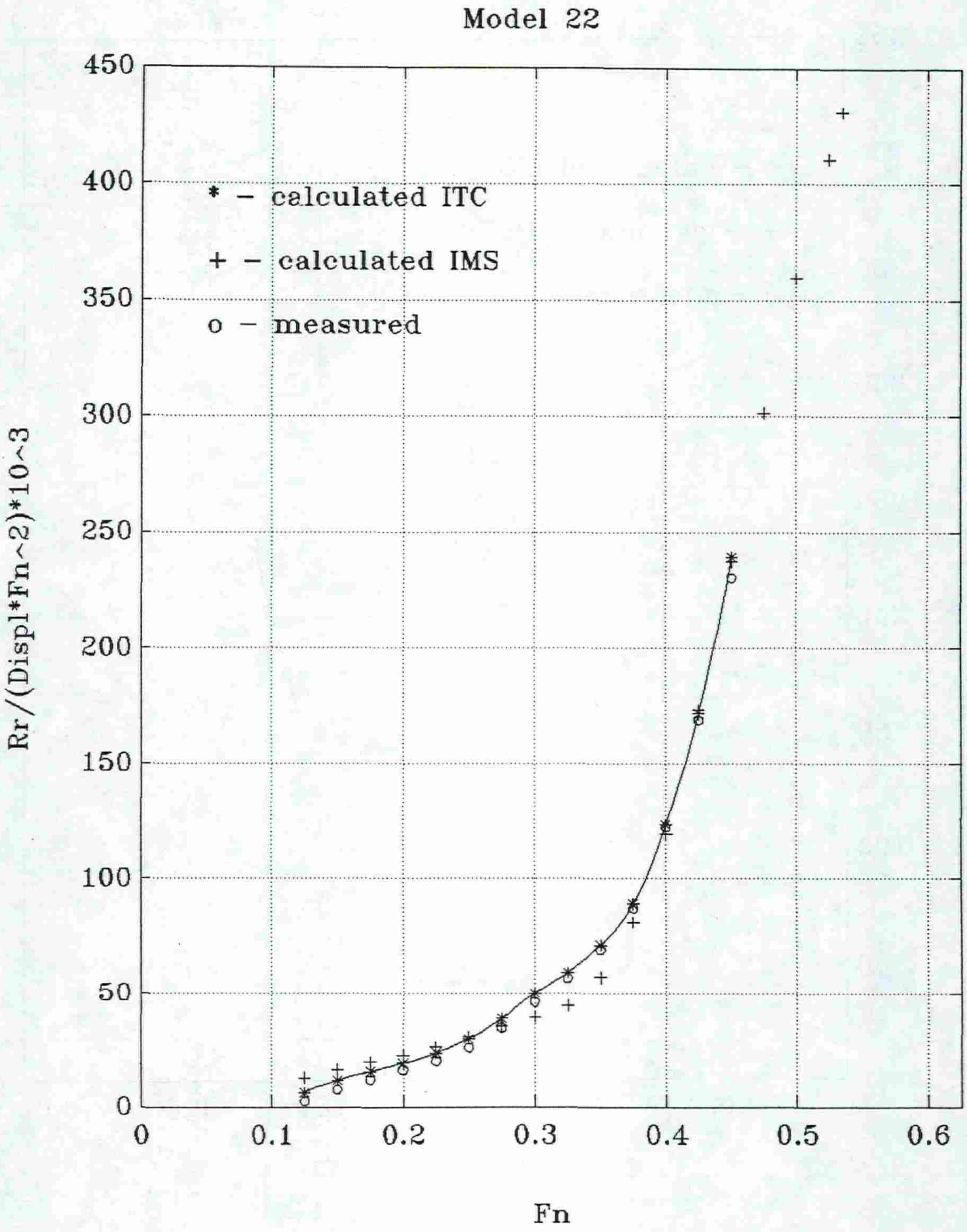


* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

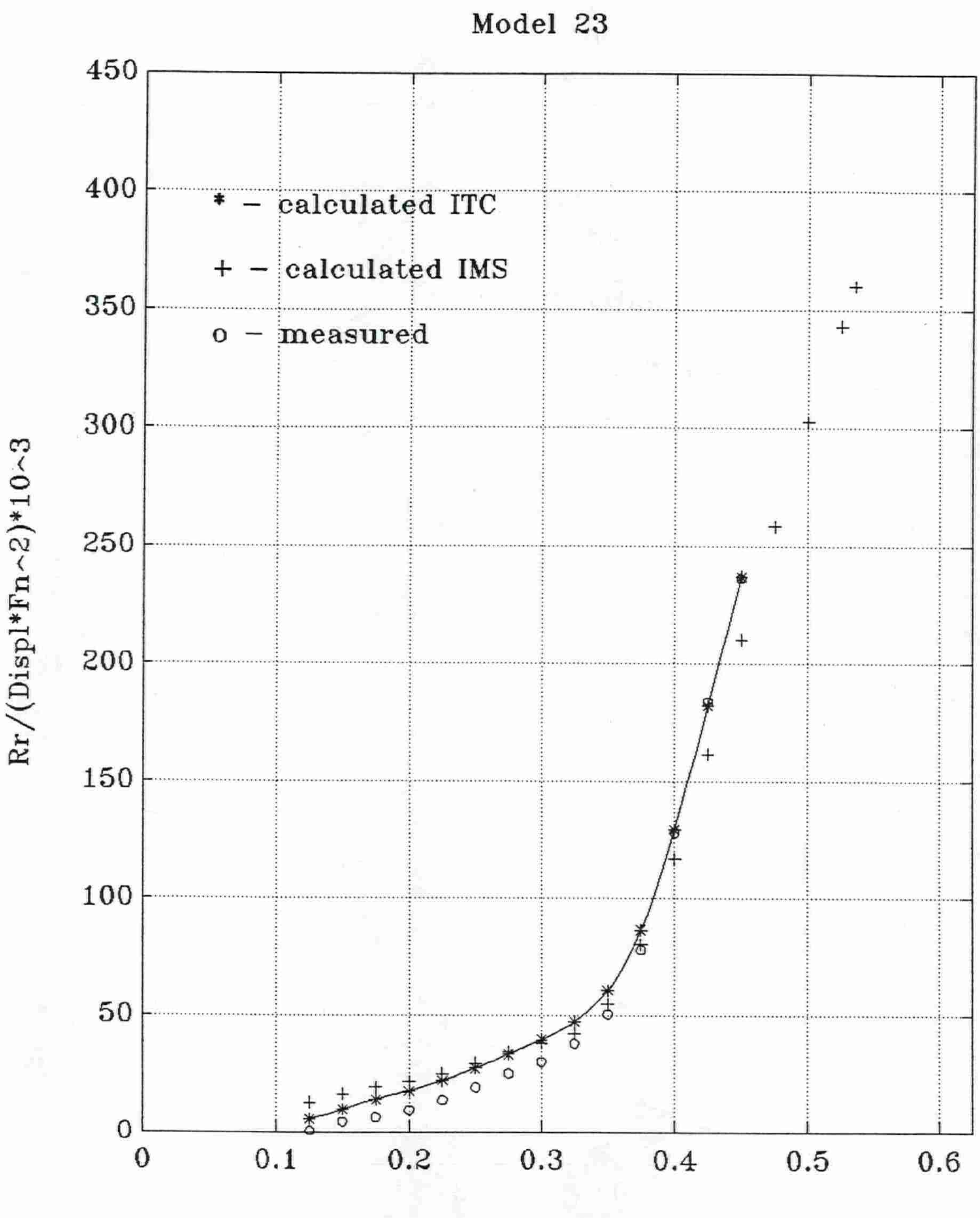
Model 21

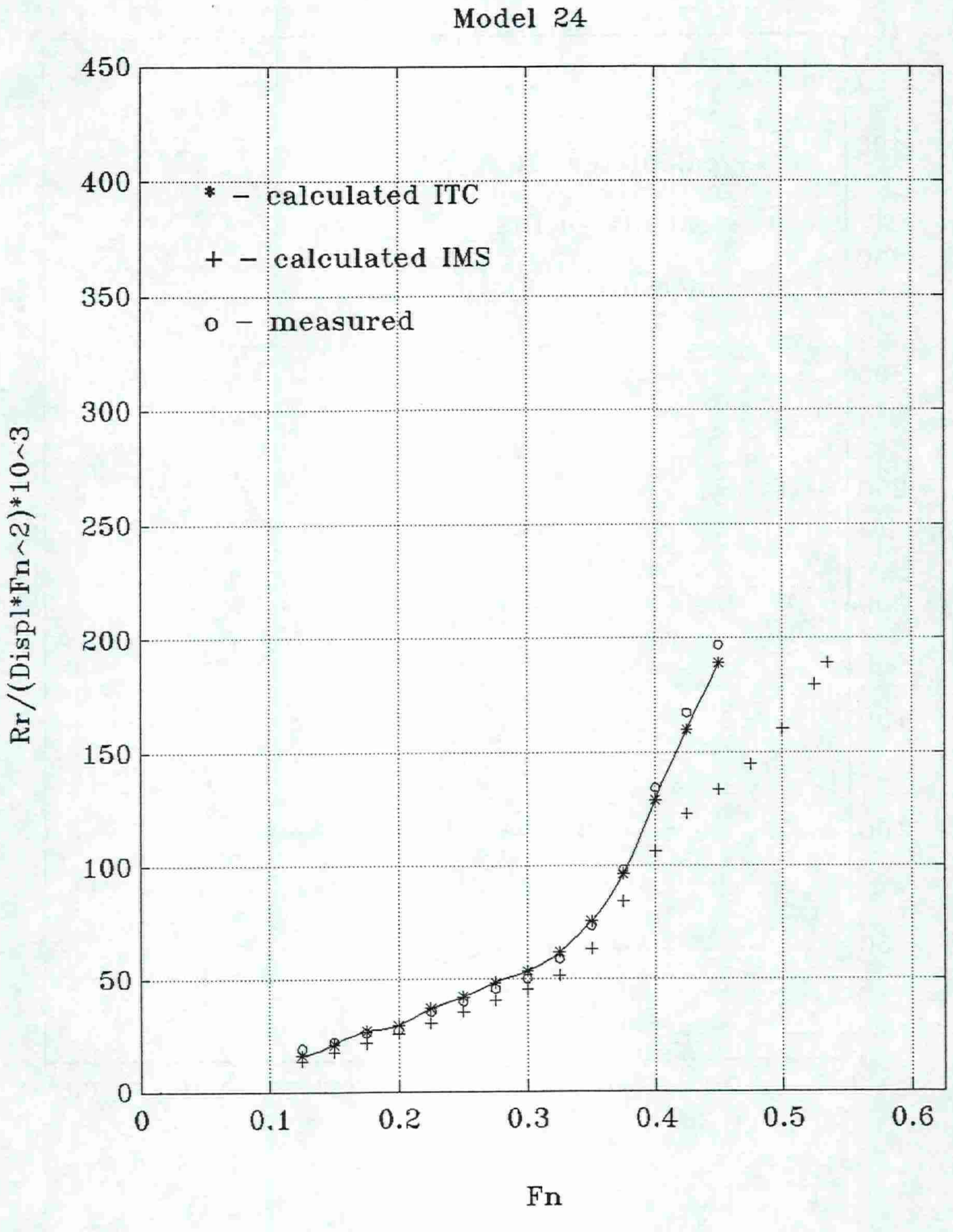


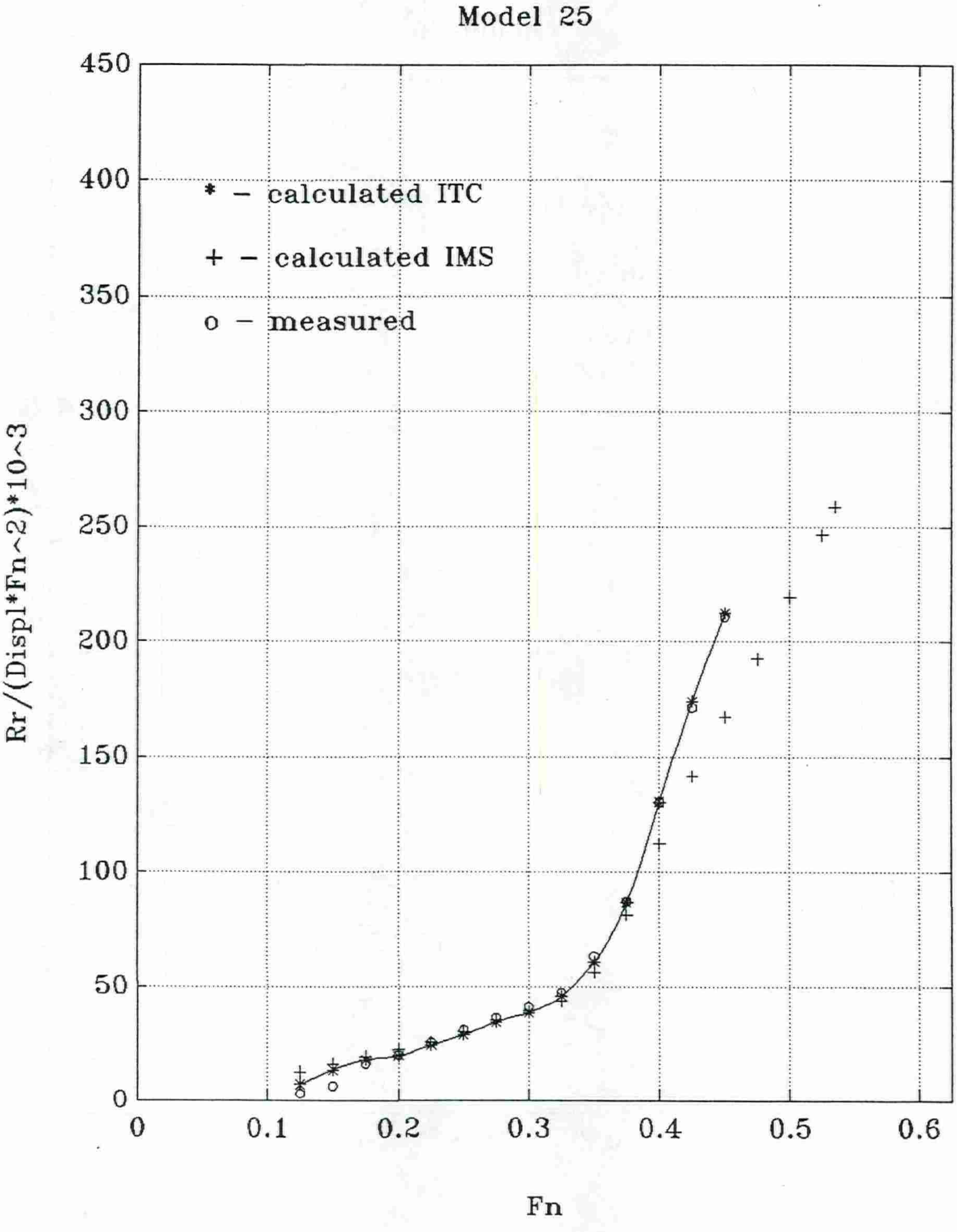
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

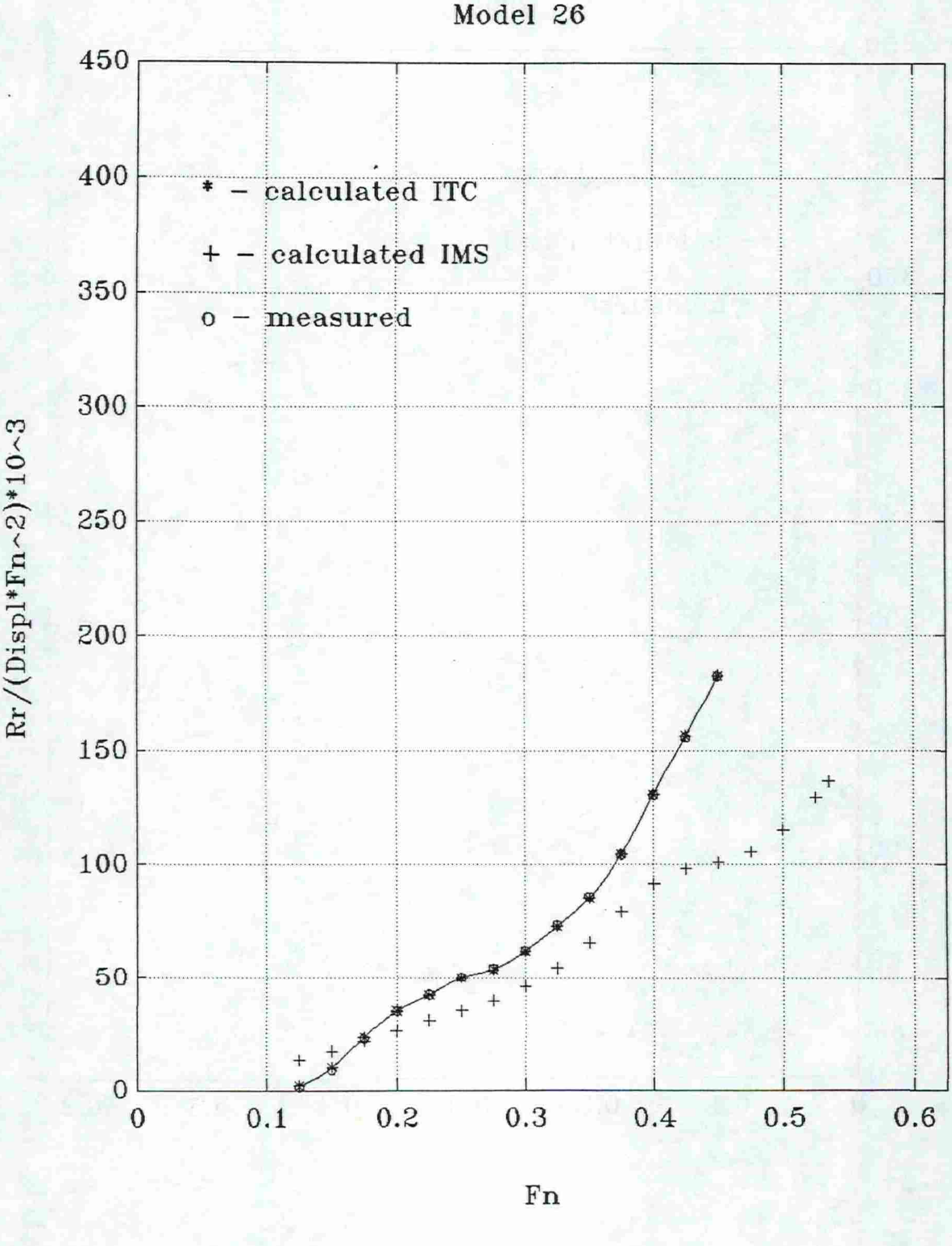


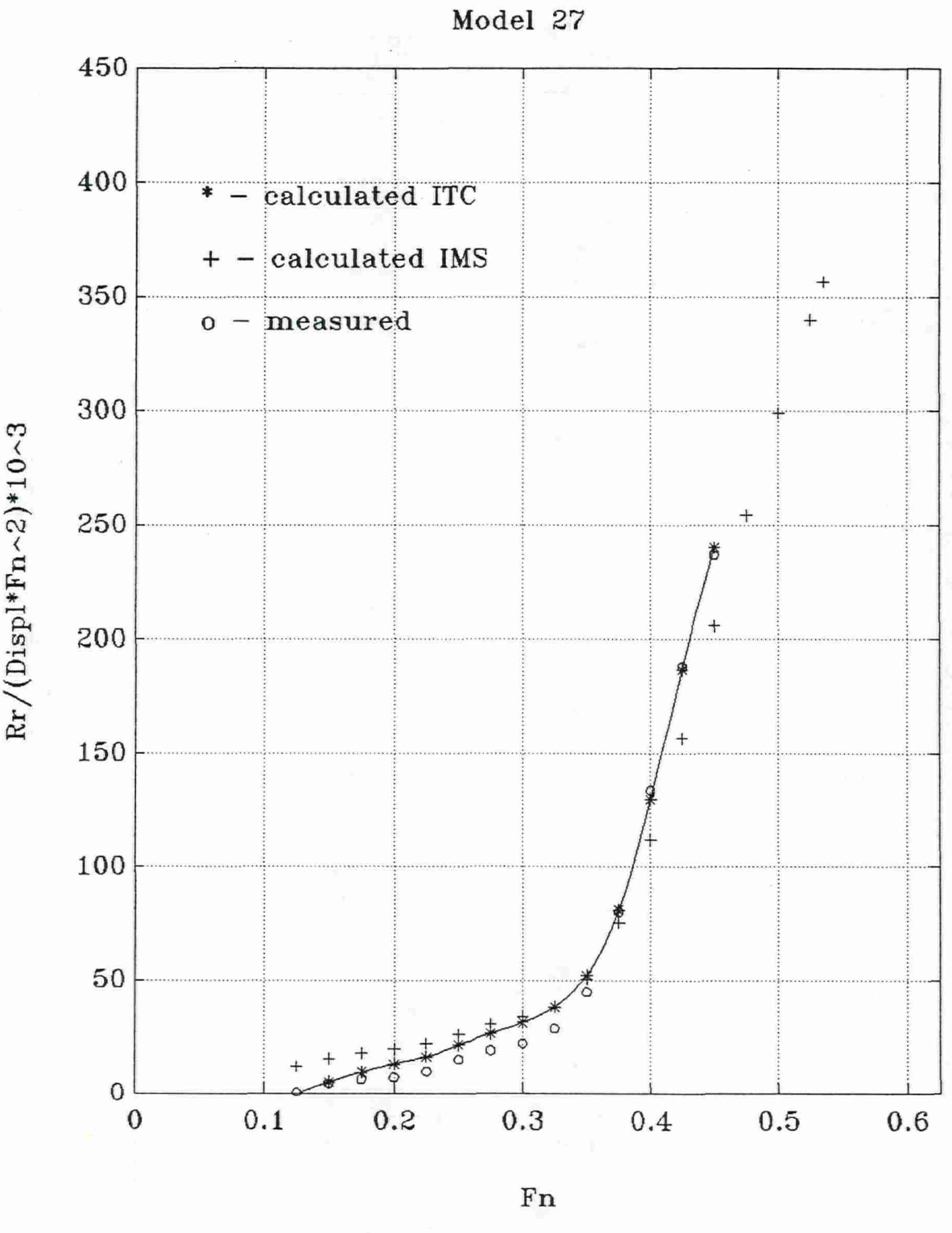
Model 22
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

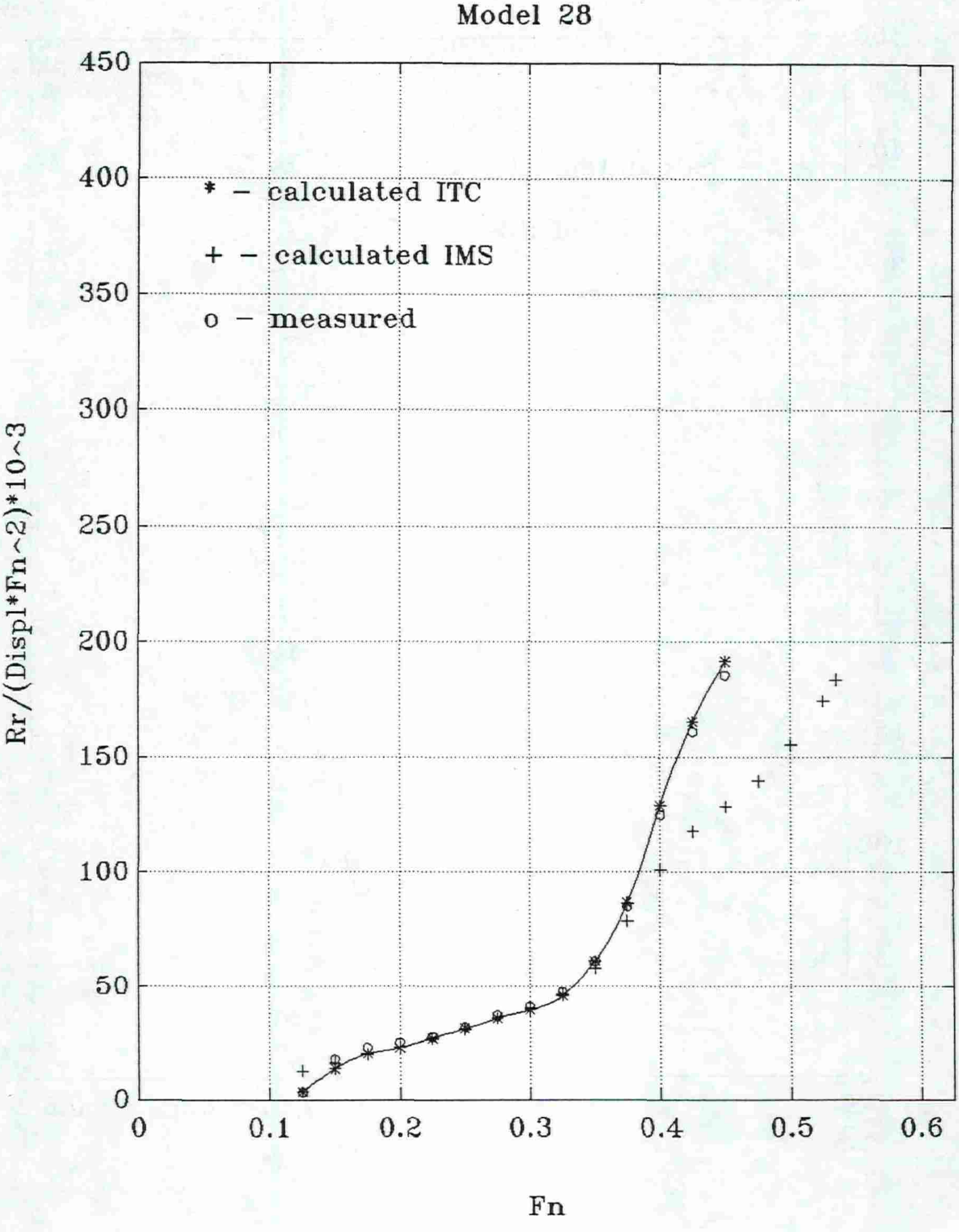

Model 23
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Model 24
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6

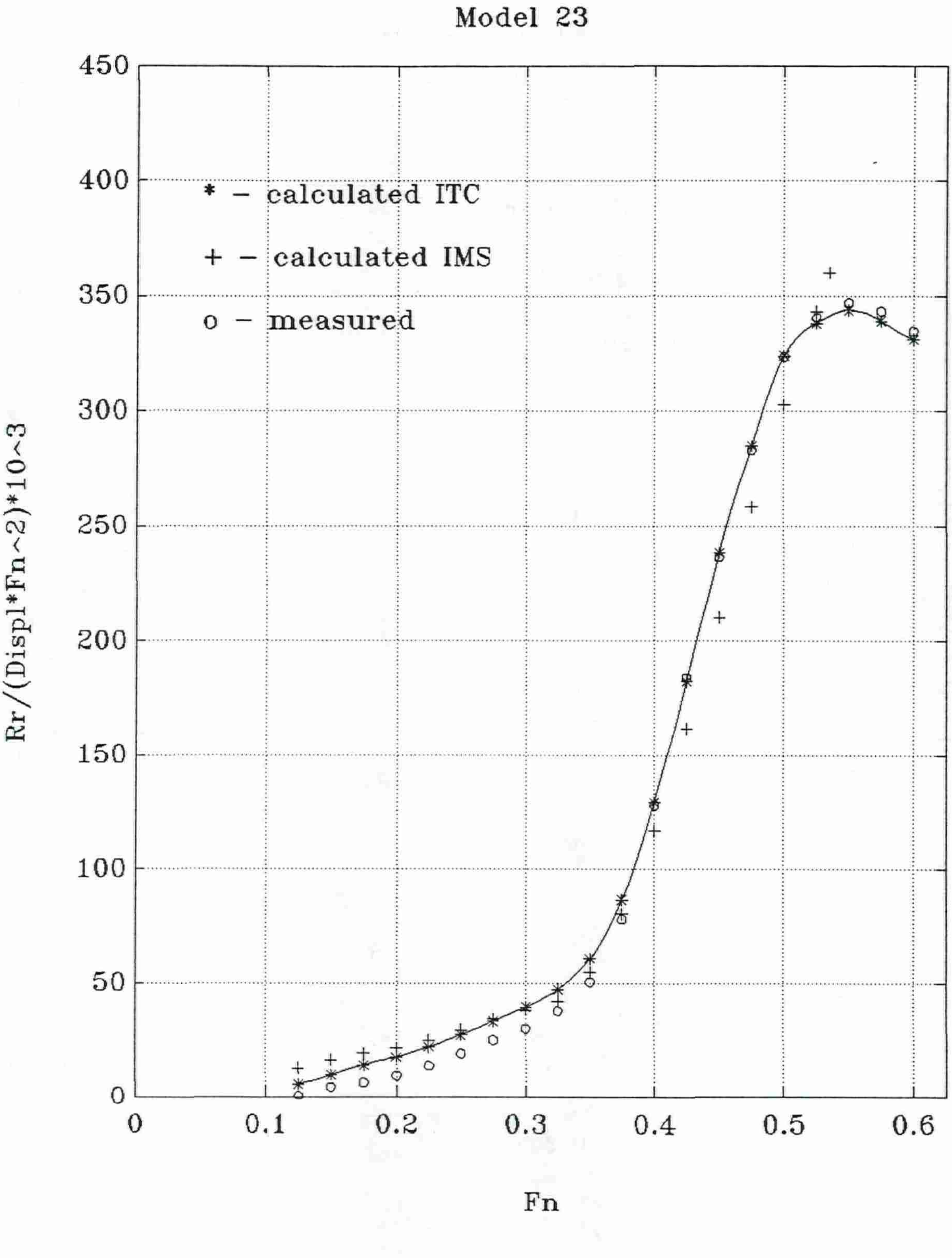

Model 25
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6


Model 26
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6


Model 27
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

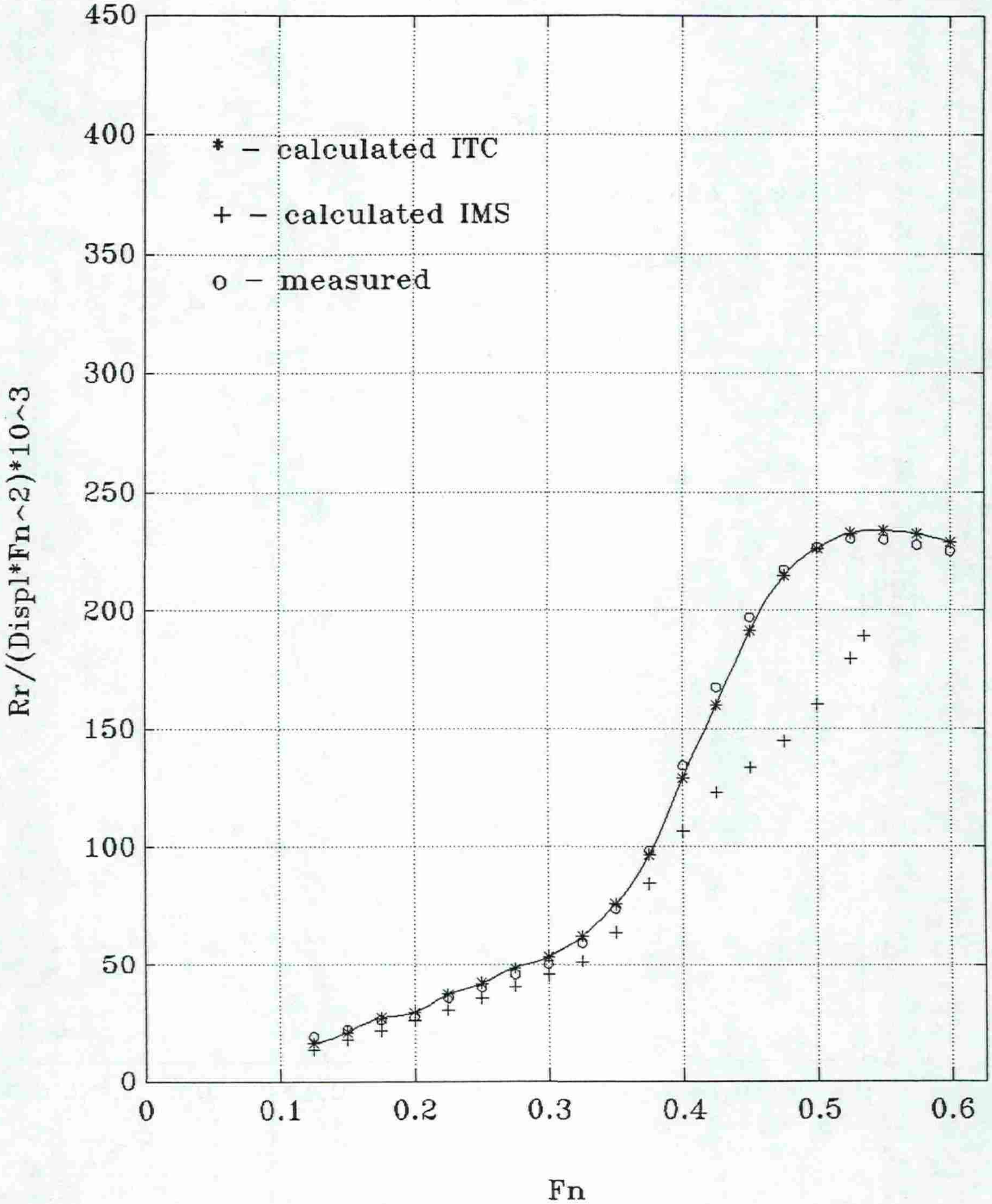


Model 28
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

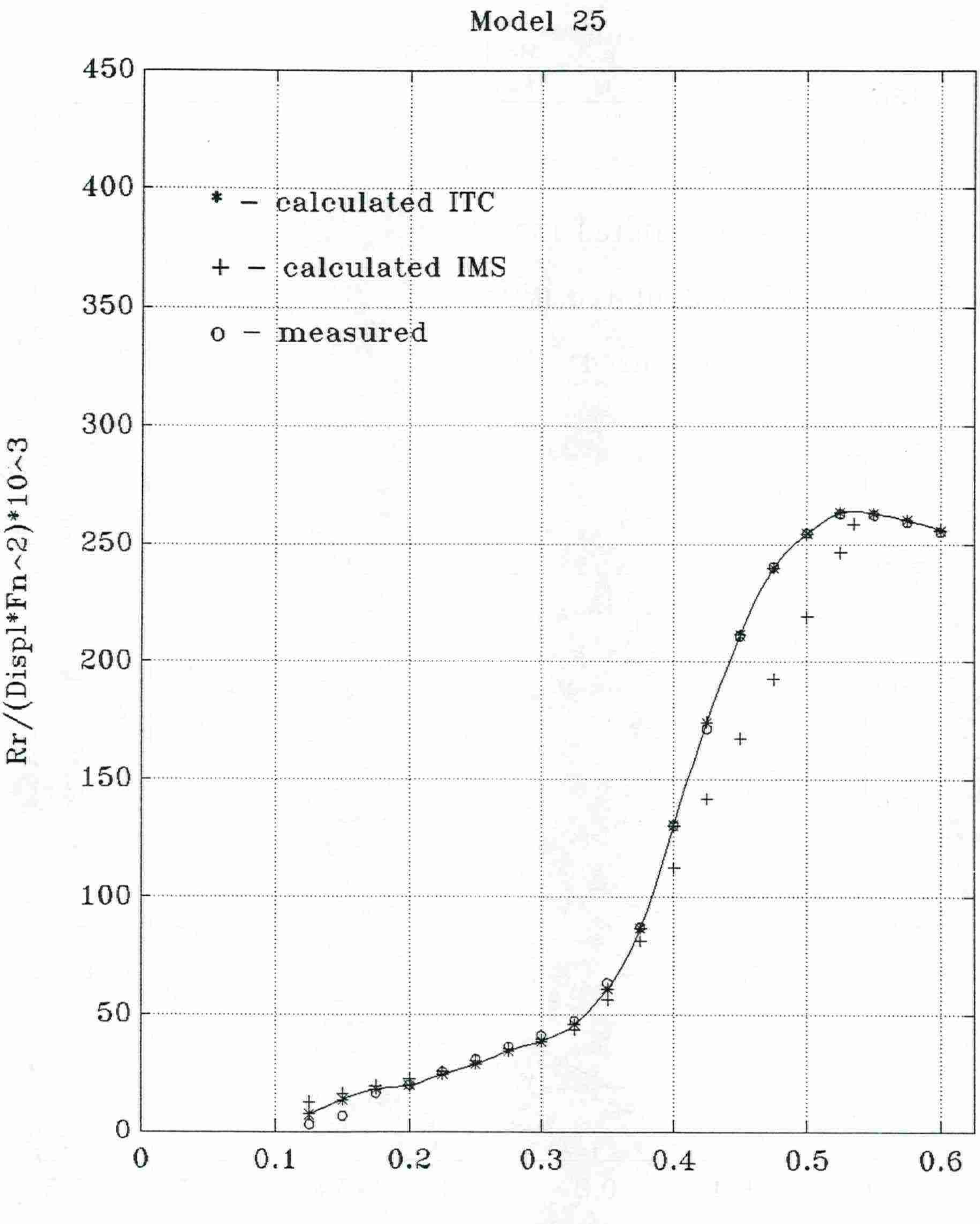


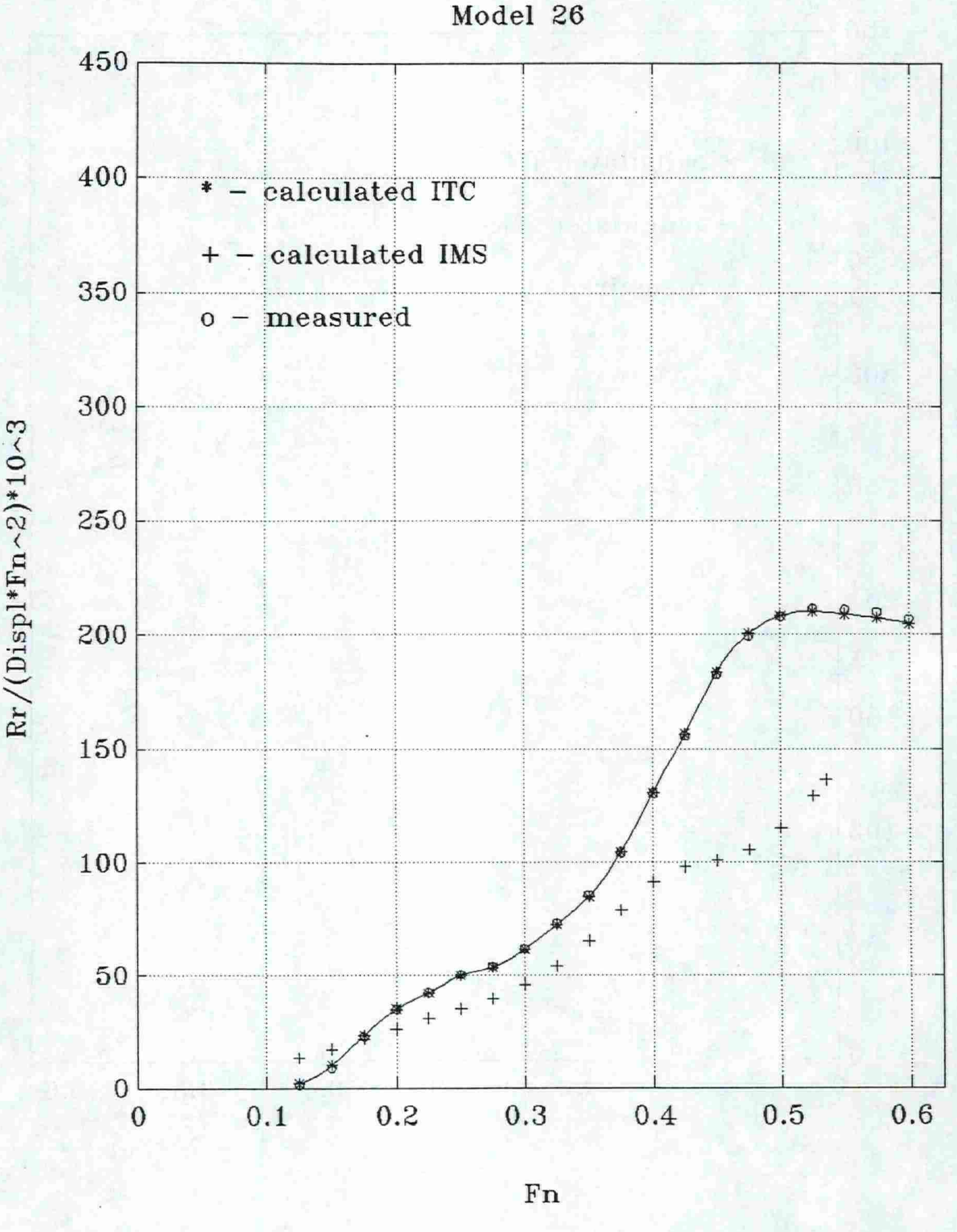
Model 23
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

Model 24

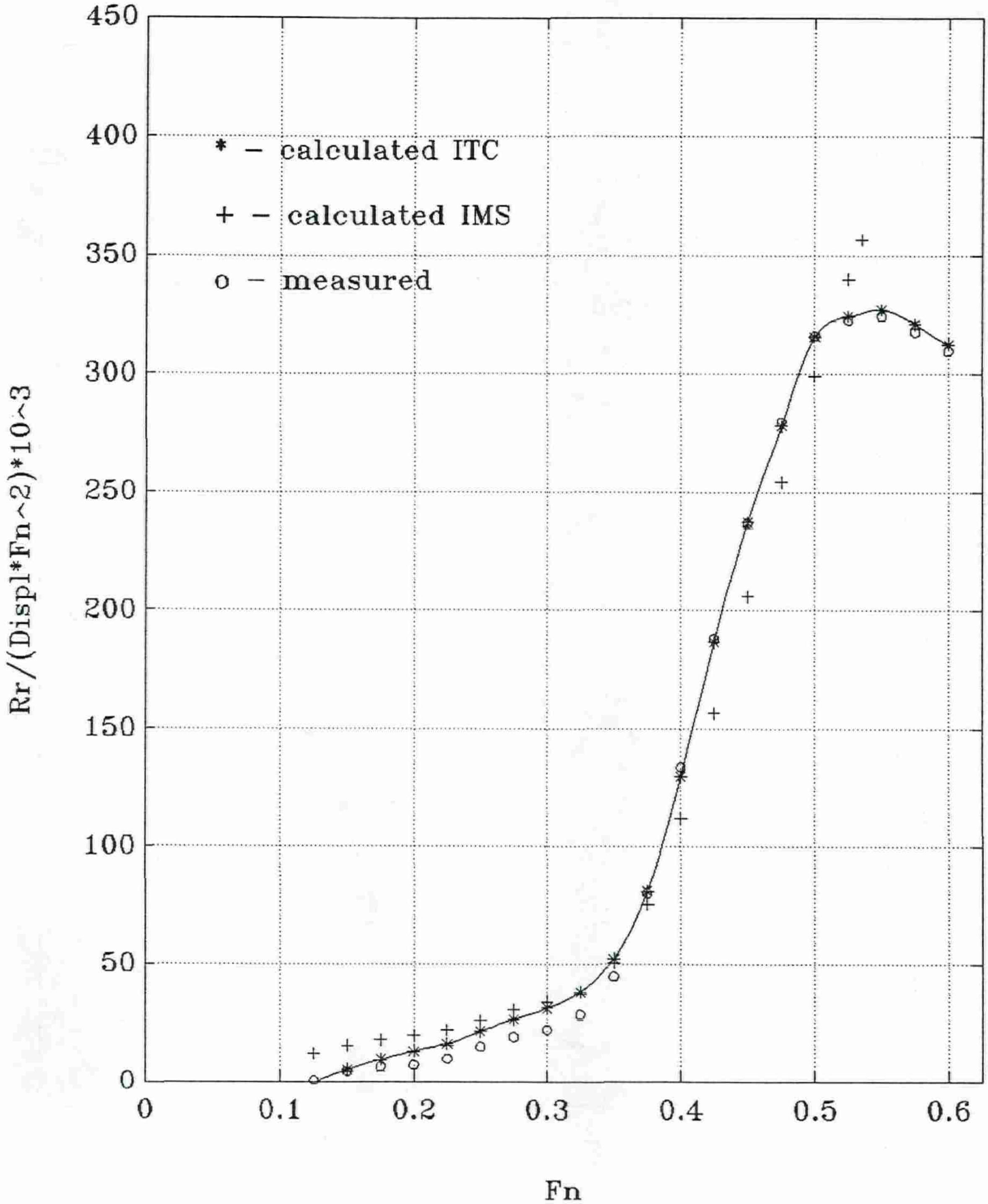


* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

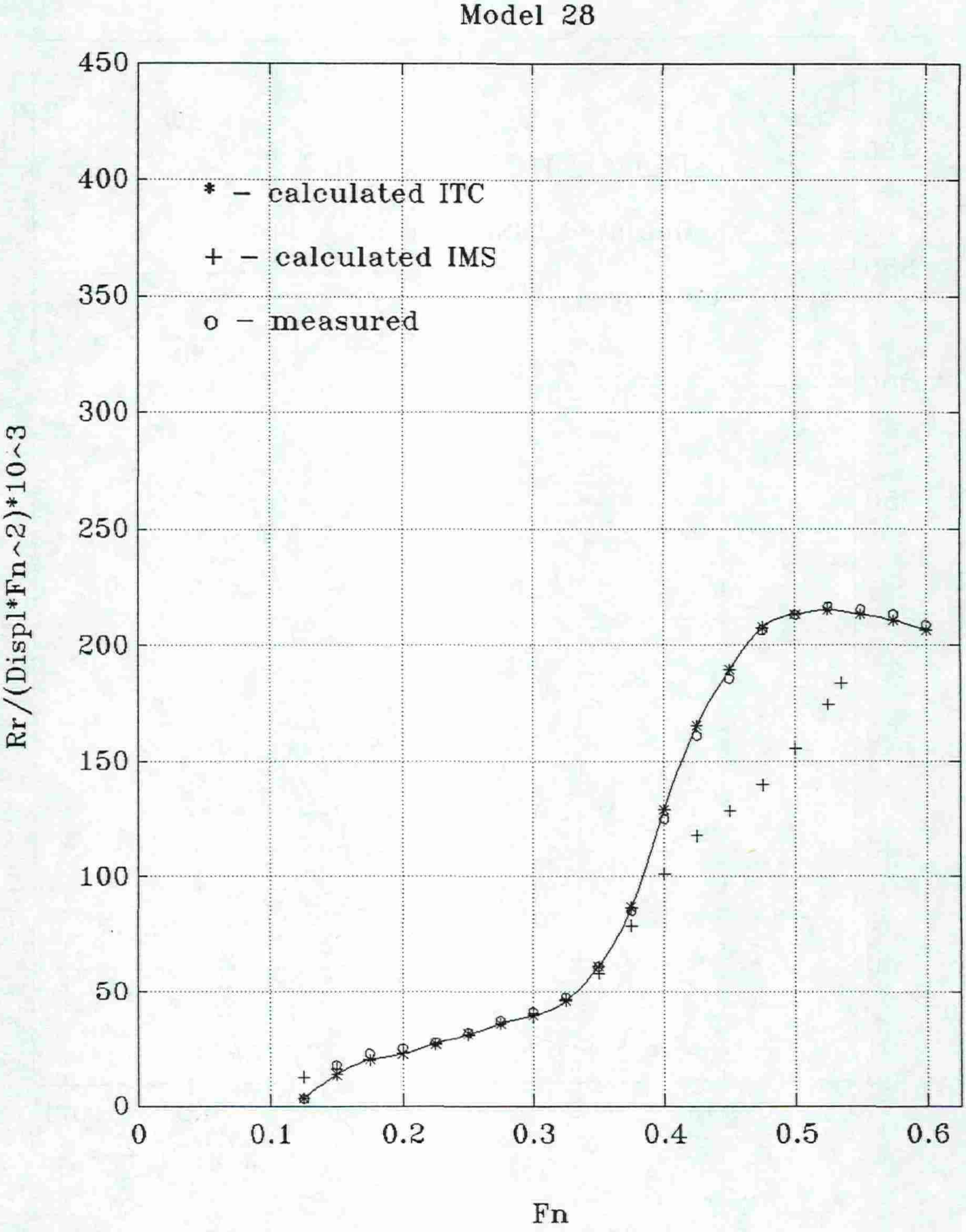

Model 25
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

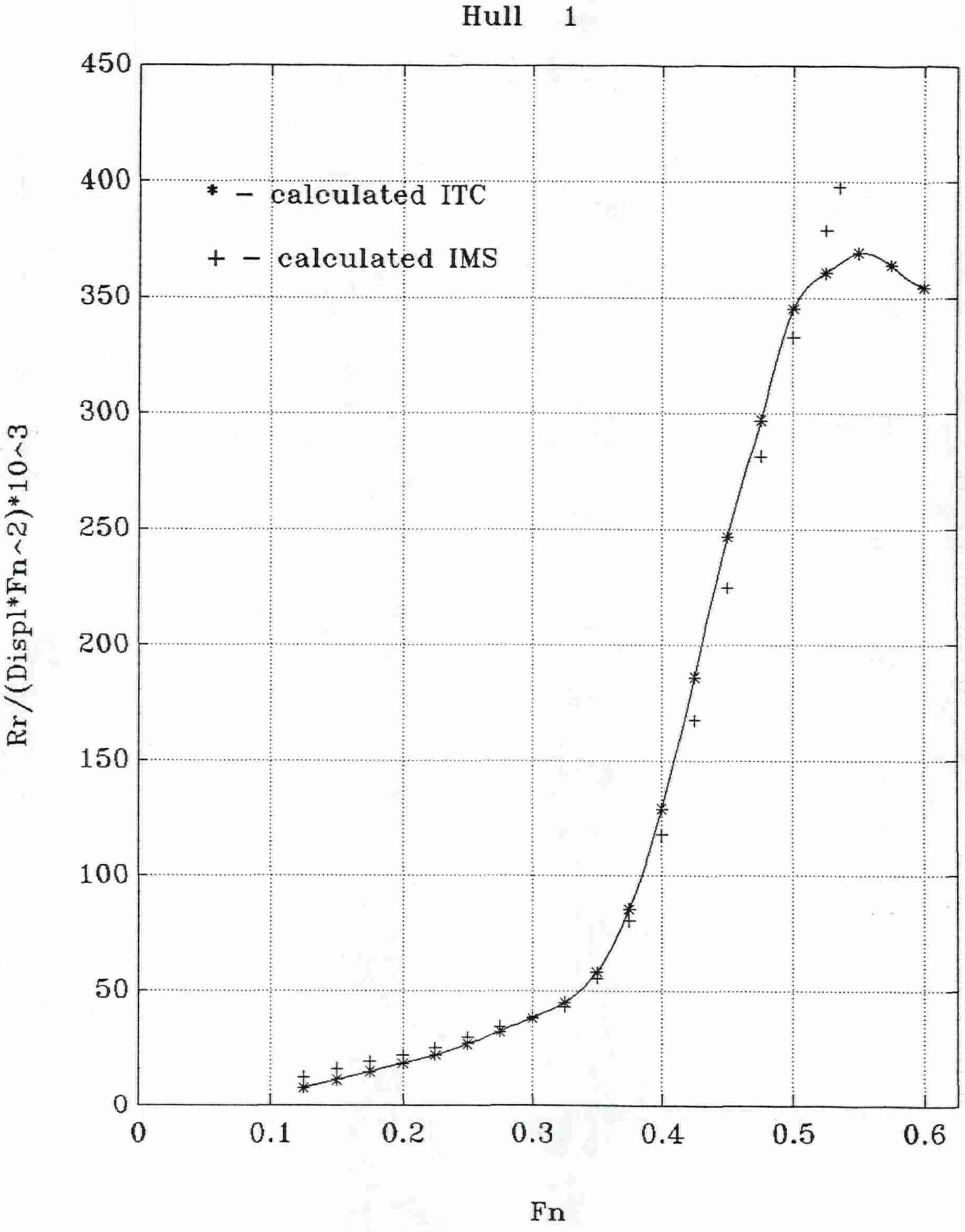

Model 26
* – calculated ITC
+ – calculated IMS
o – measured
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6

Model 27

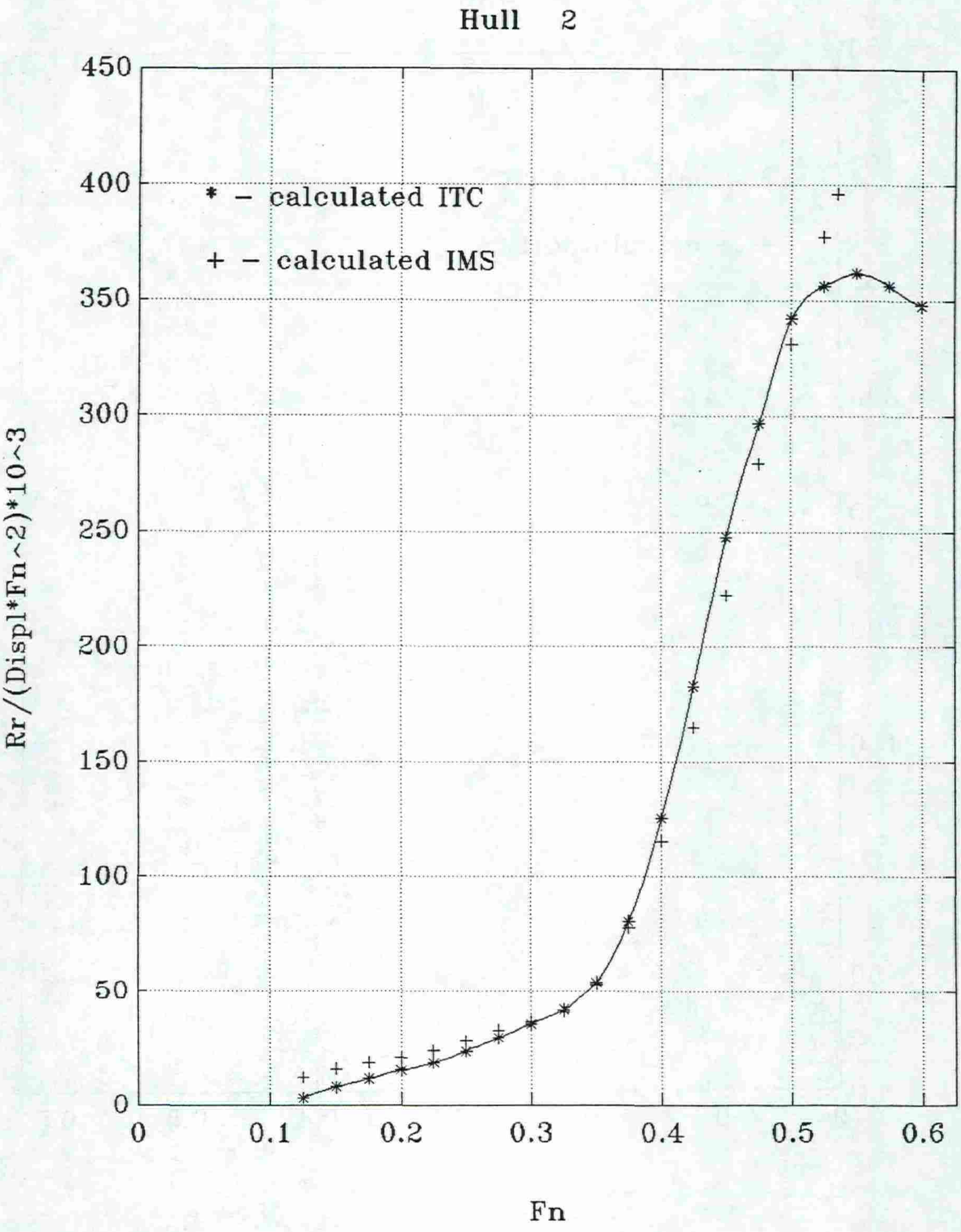


450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* – calculated ITC
+ – calculated IMS
o – measured
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn


Model 28
* - calculated ITC
+ - calculated IMS
o - measured
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

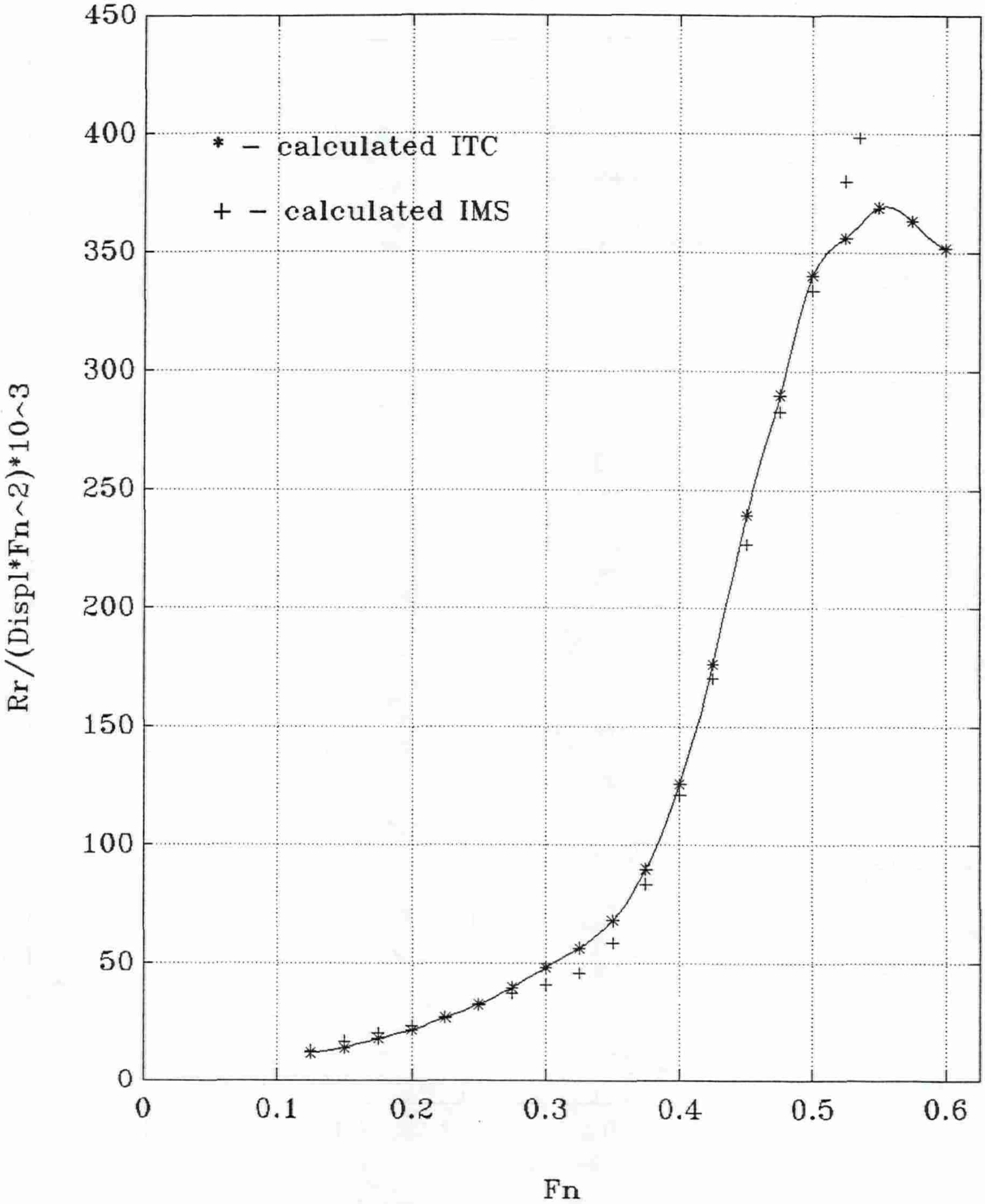


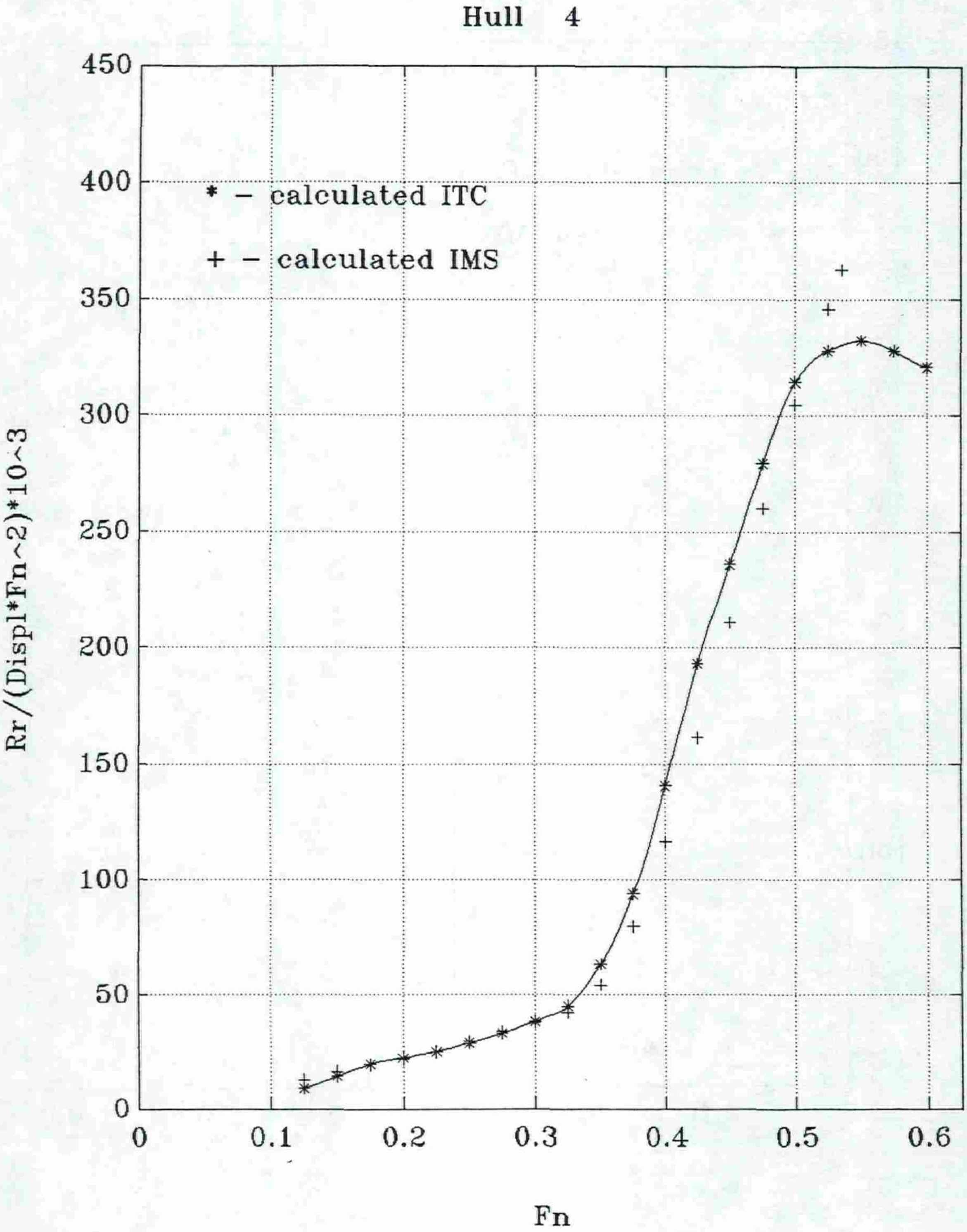
Hull 1
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6



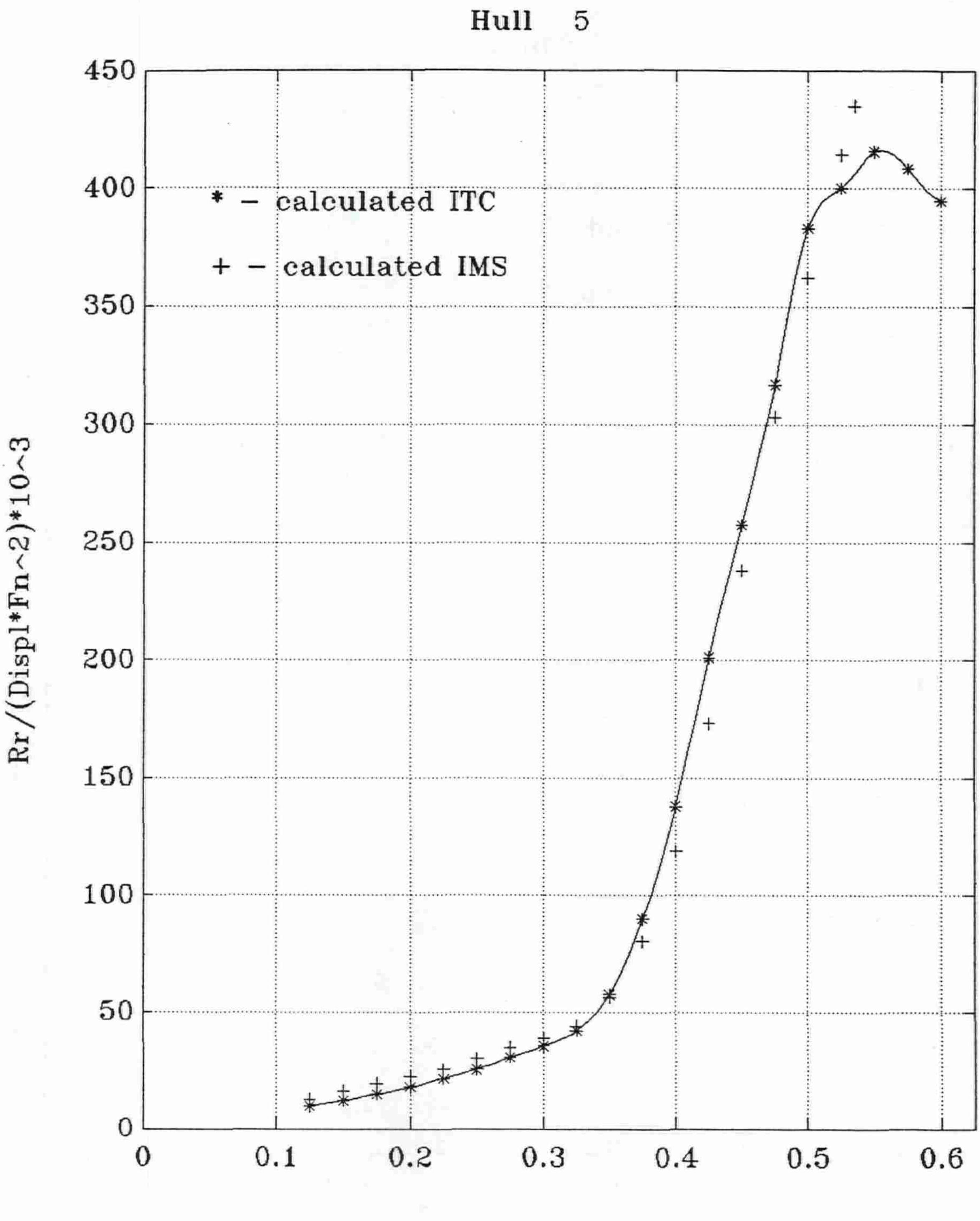
Hull 2
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

Hull 3

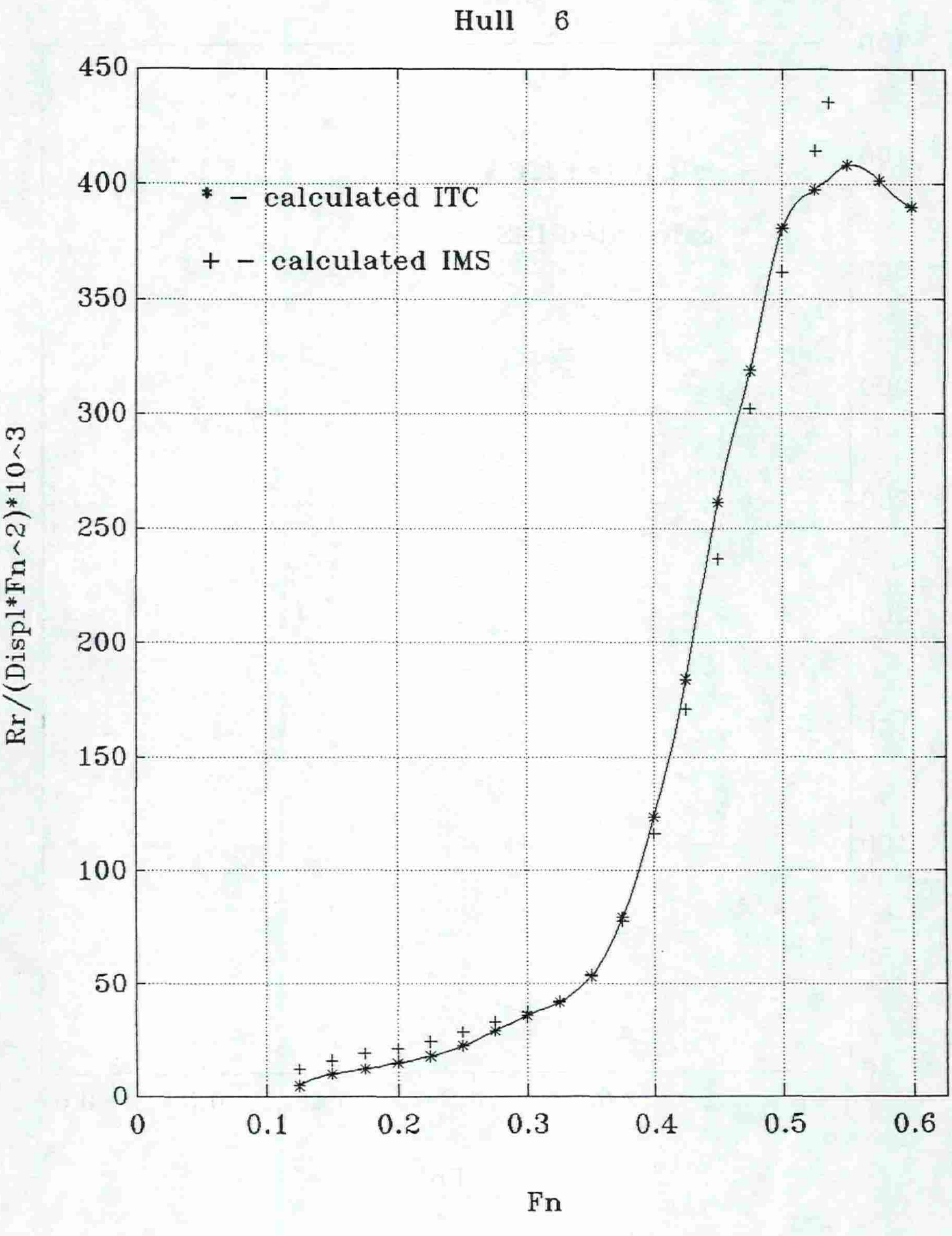

450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* – calculated ITC
+ – calculated IMS
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn



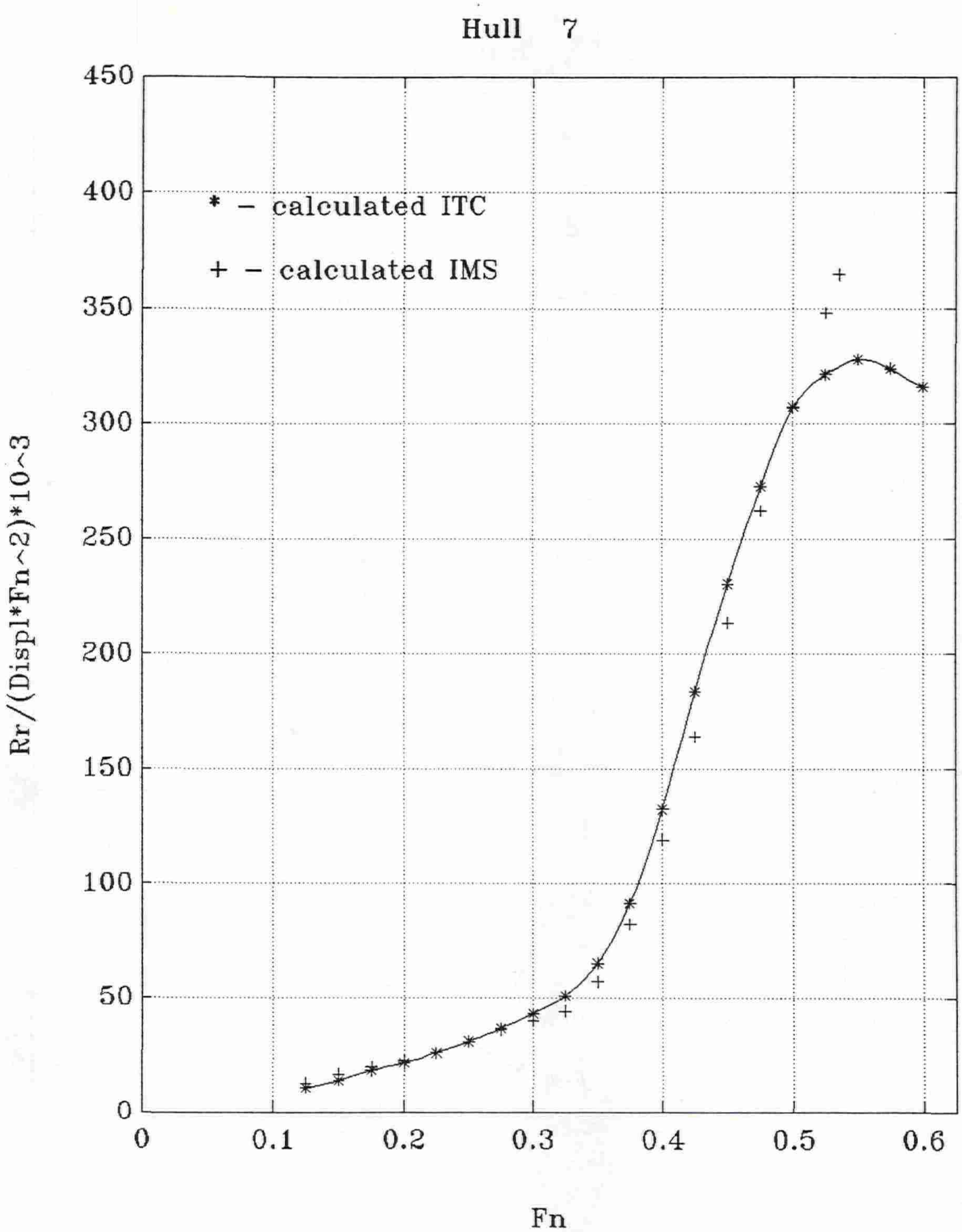
Hull 4
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

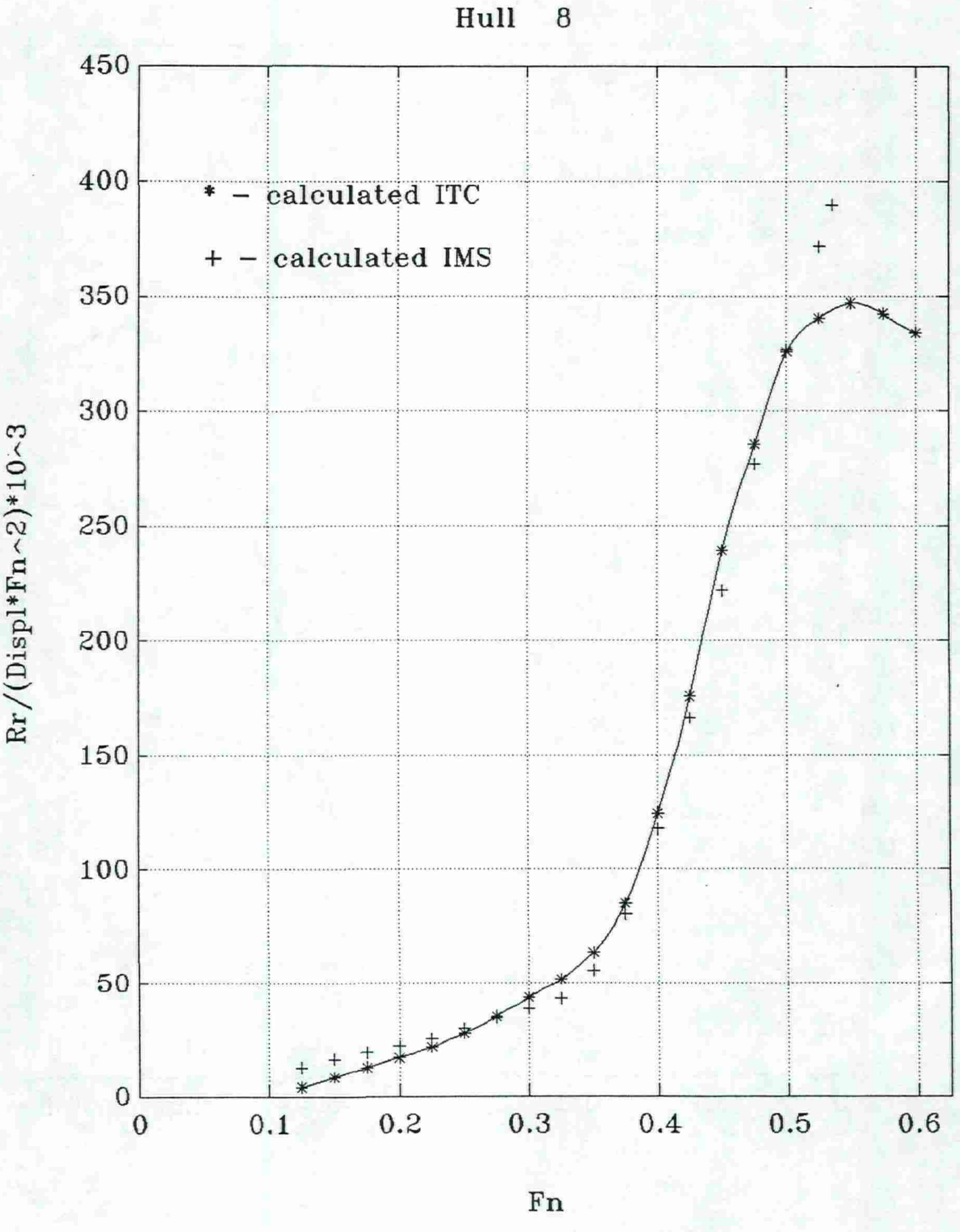


Hull 5
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

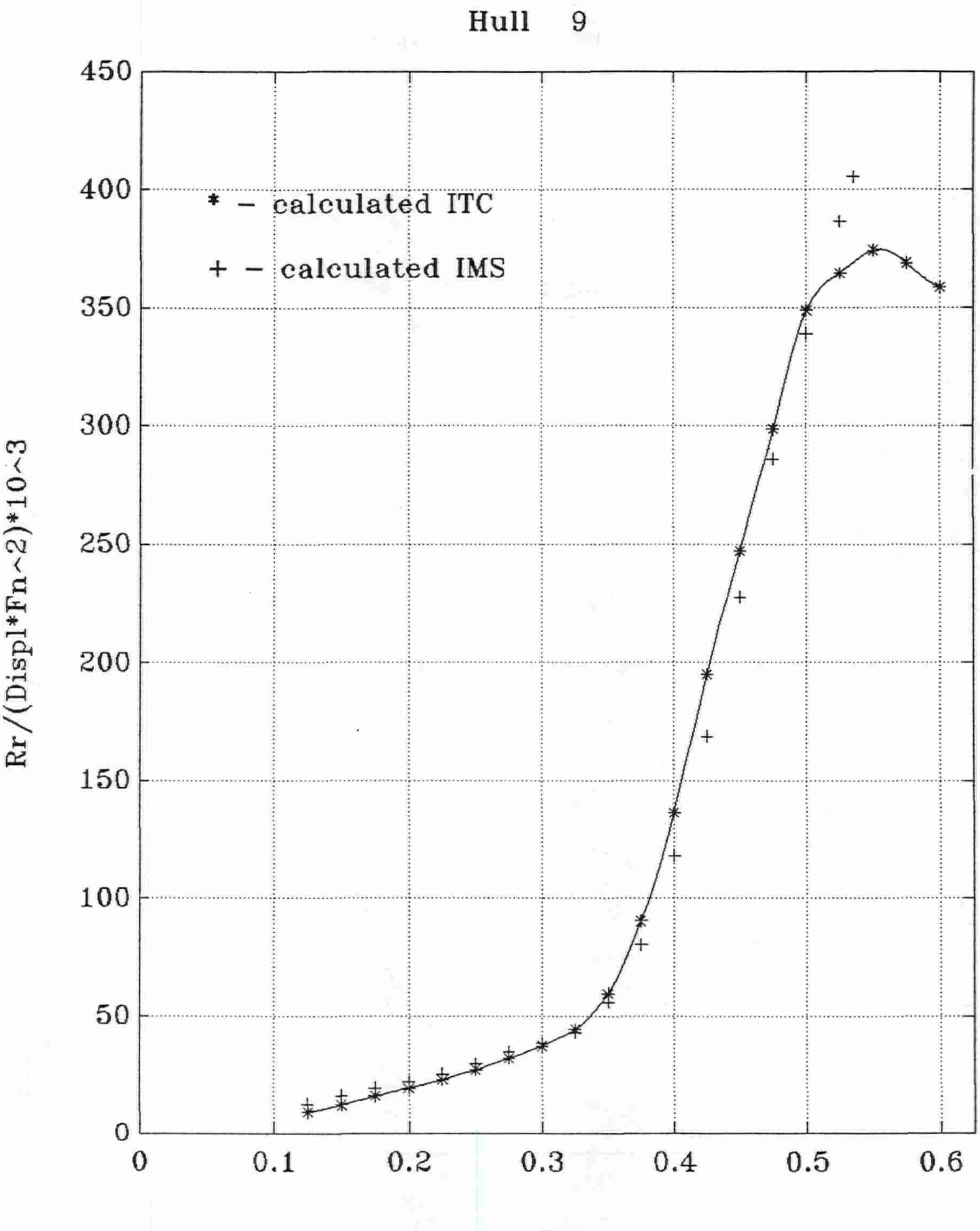


Hull 6
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

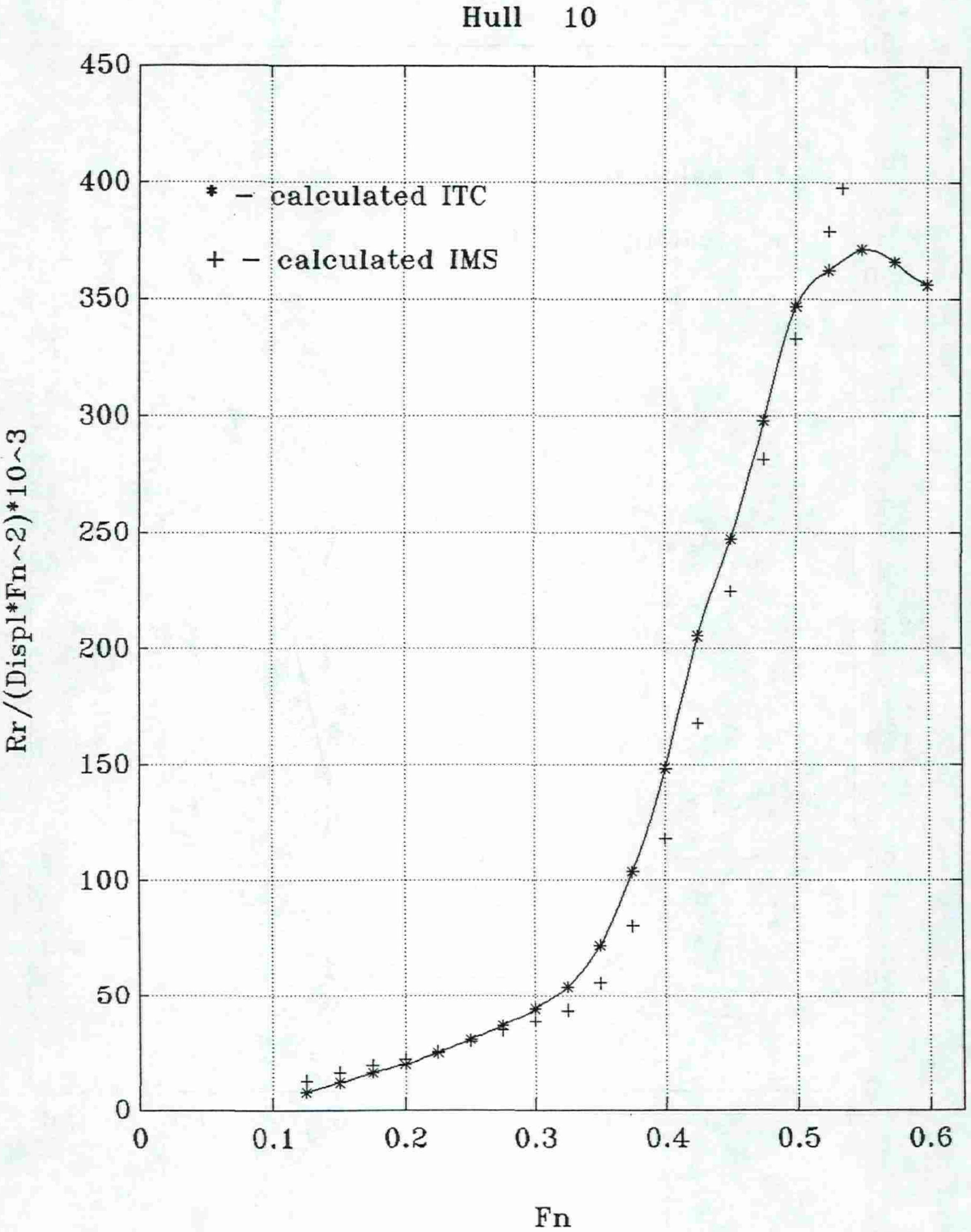

Hull 7
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6



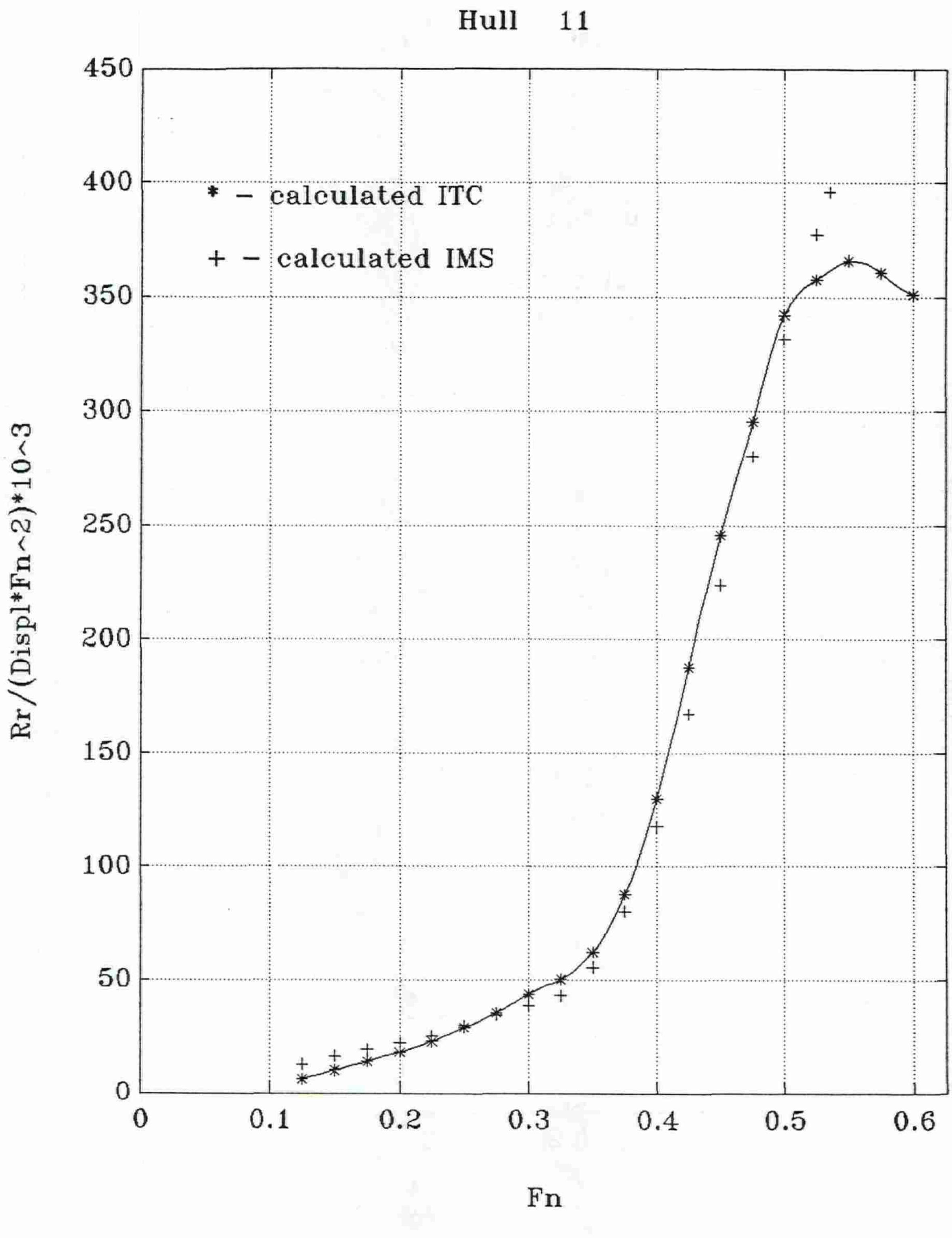
Hull 8
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

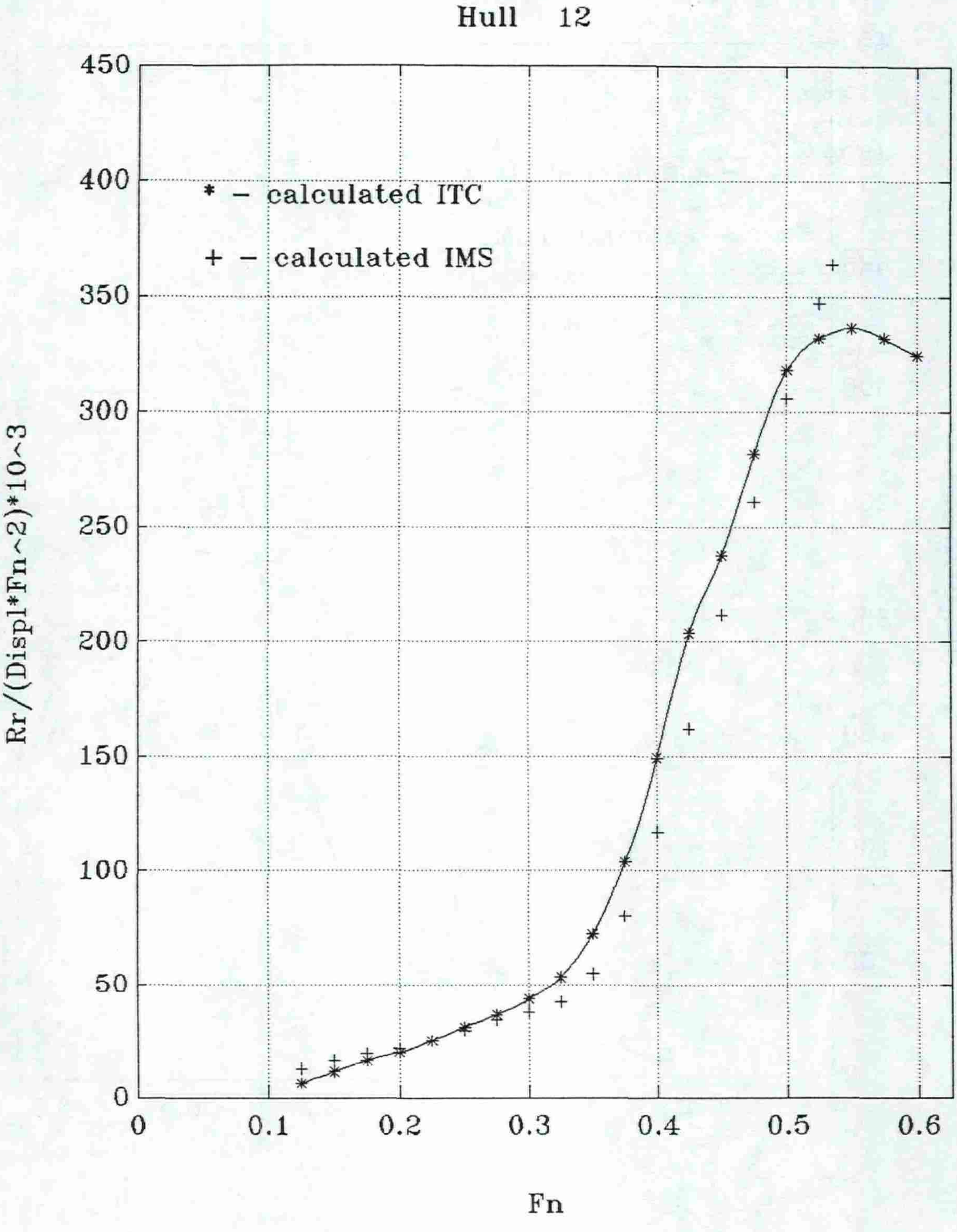


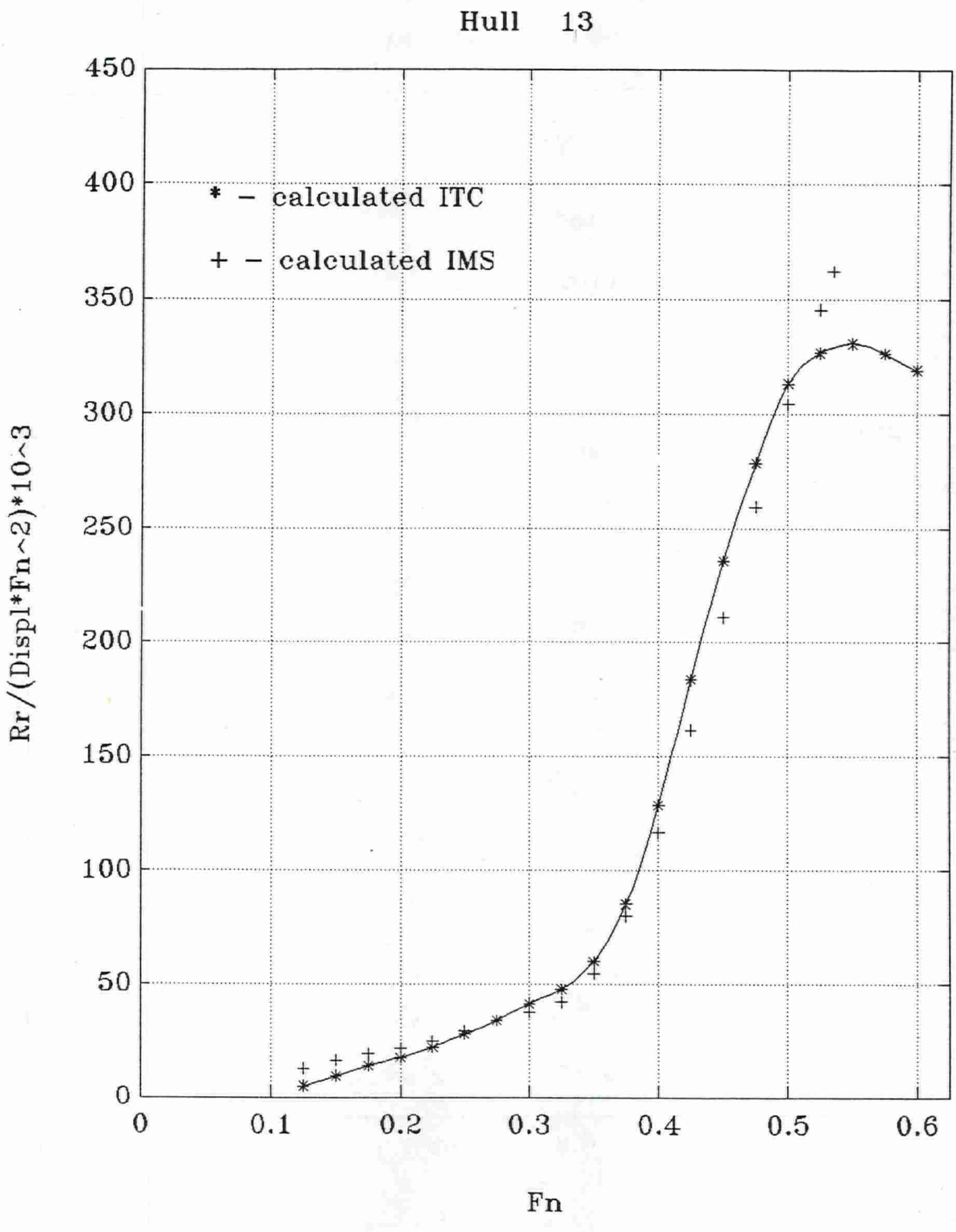
Hull 9
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

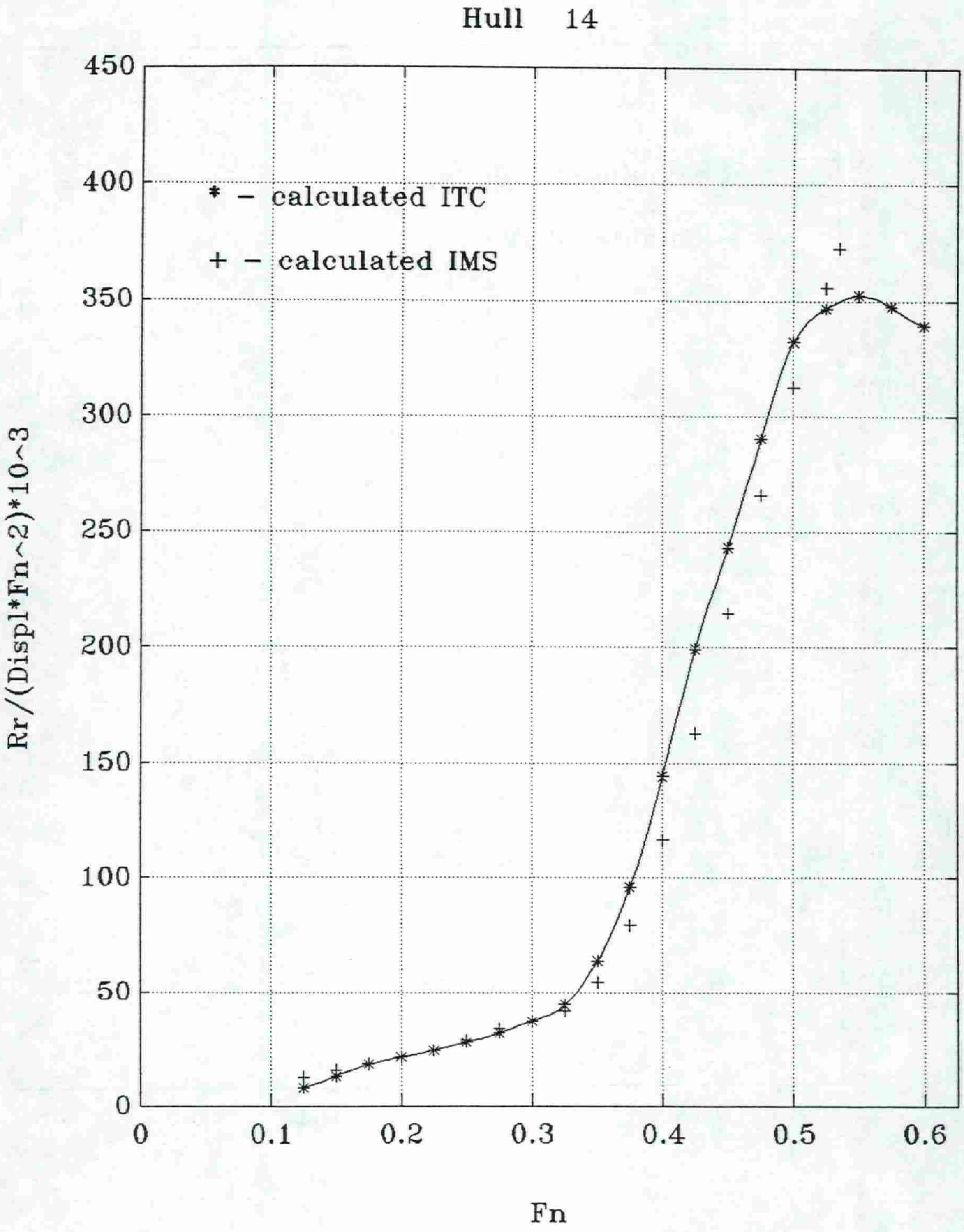


Hull 10
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

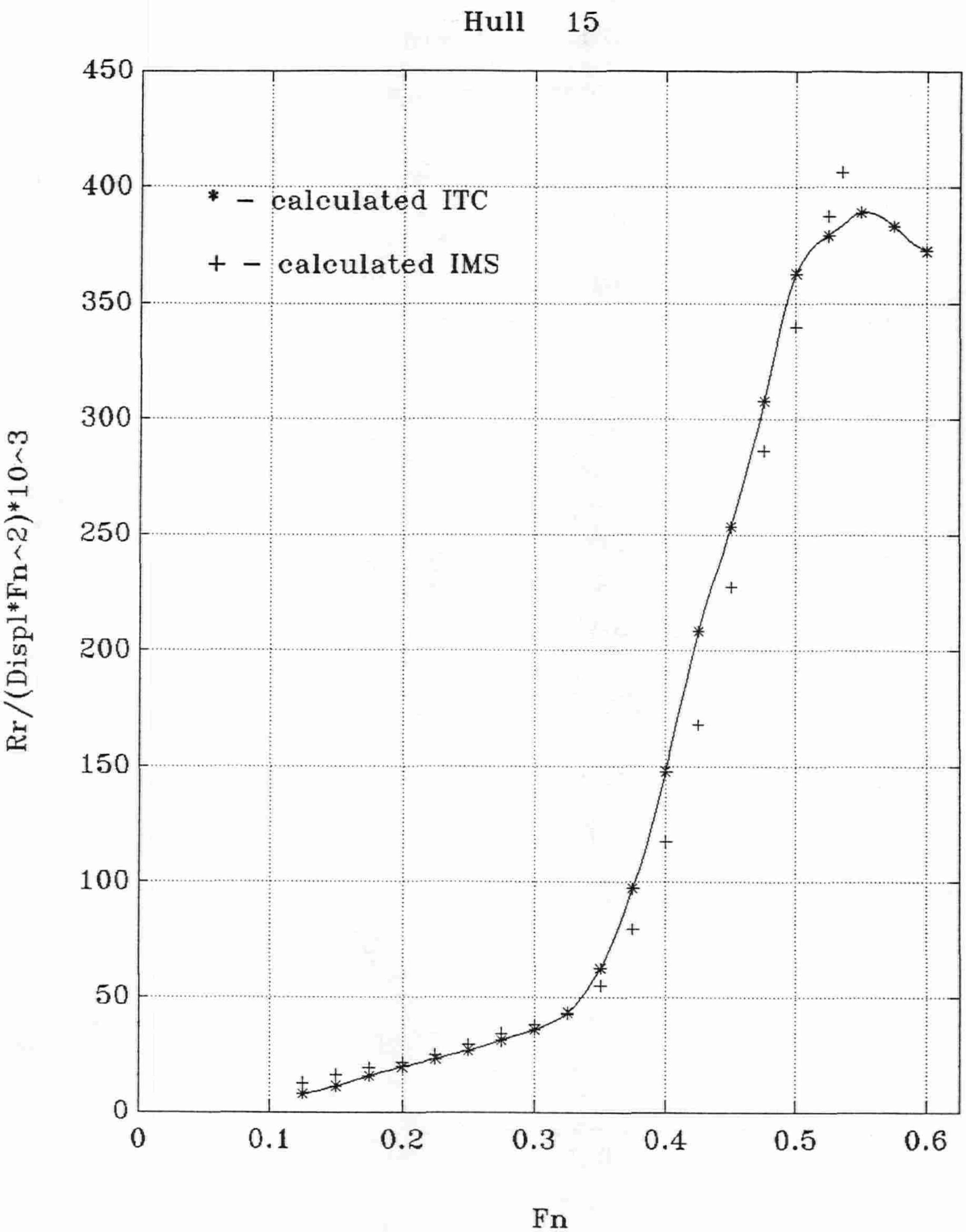

Hull 11
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6


Hull 12
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

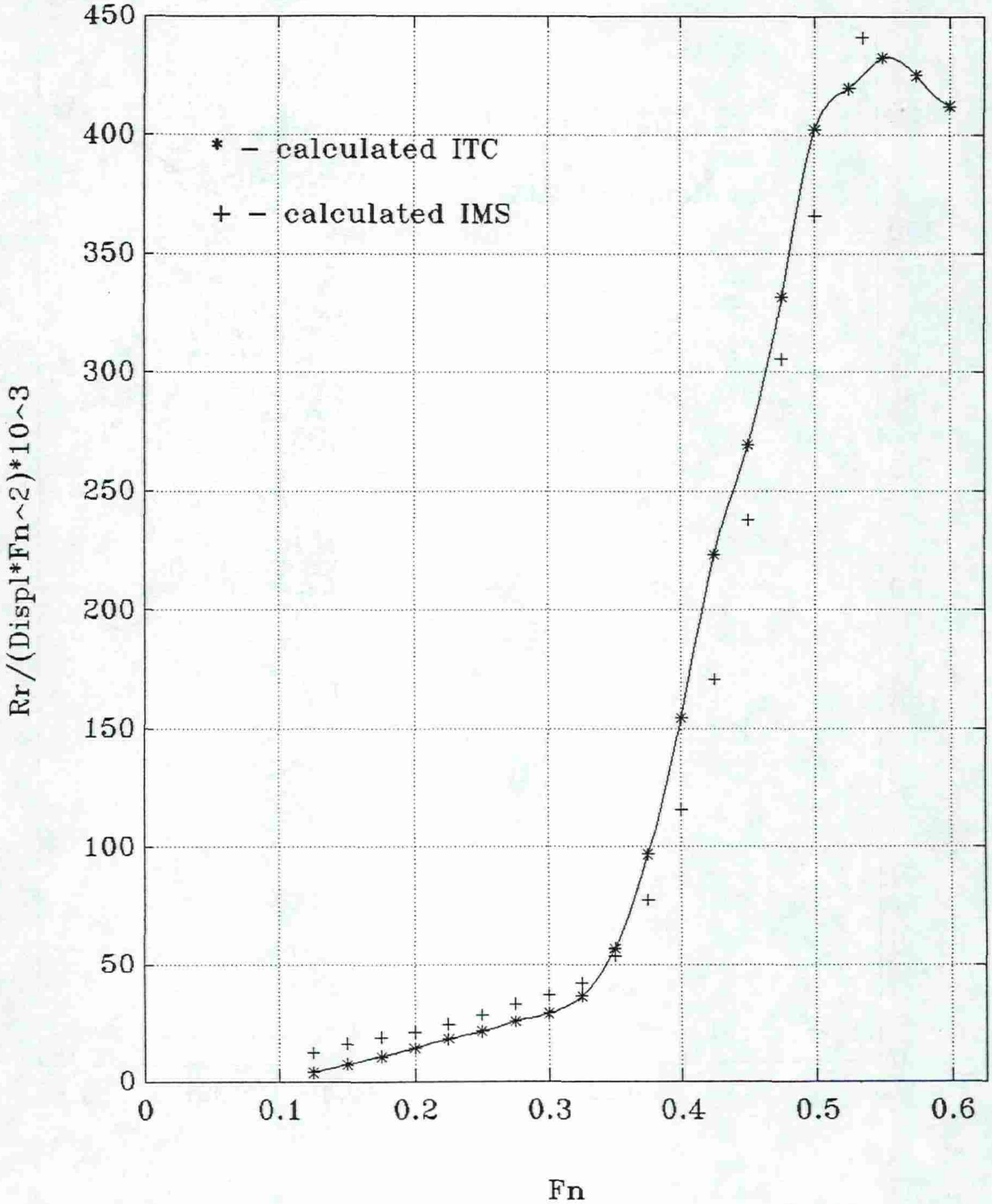

Hull 13
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6



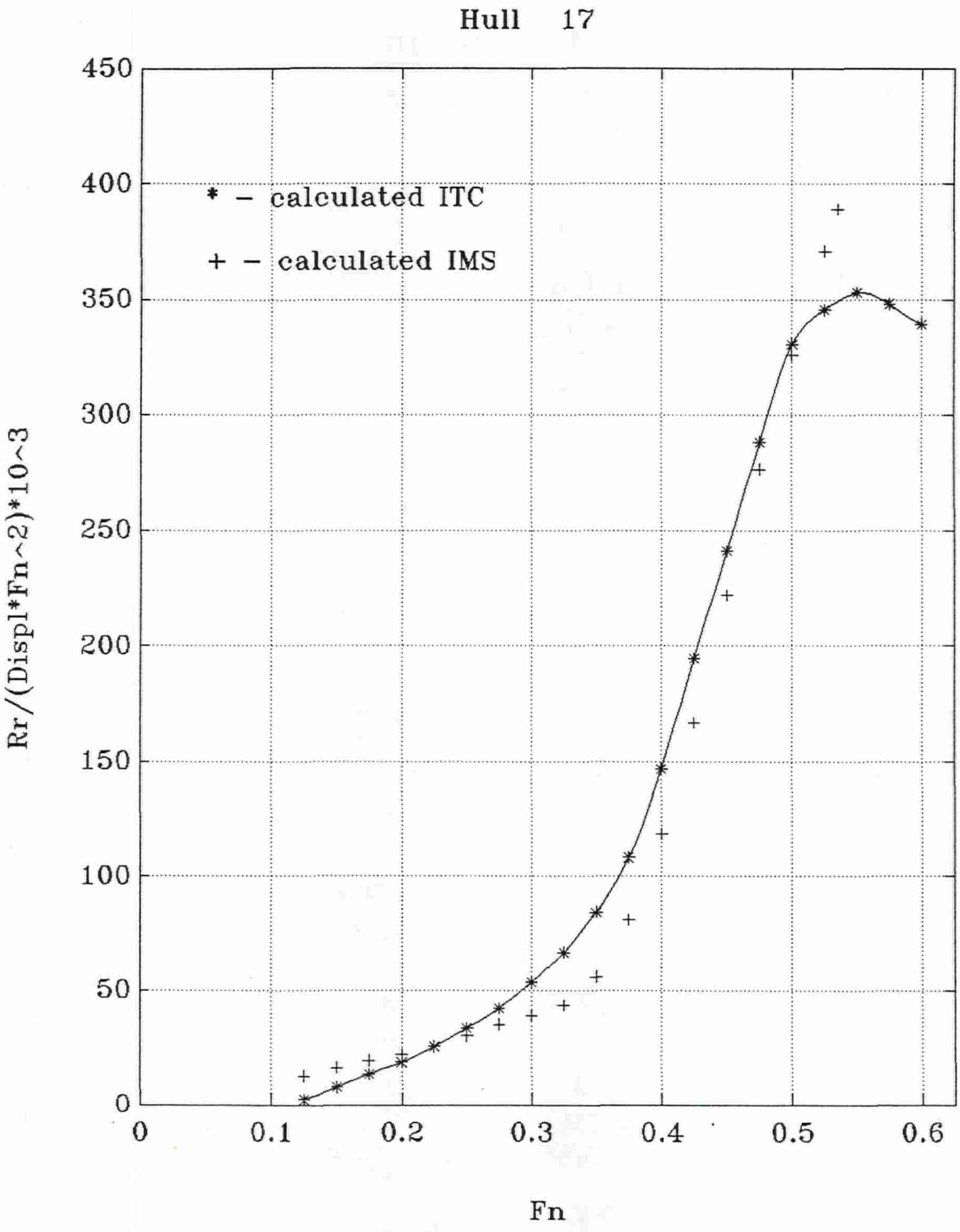
Hull 14
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Hull 15
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

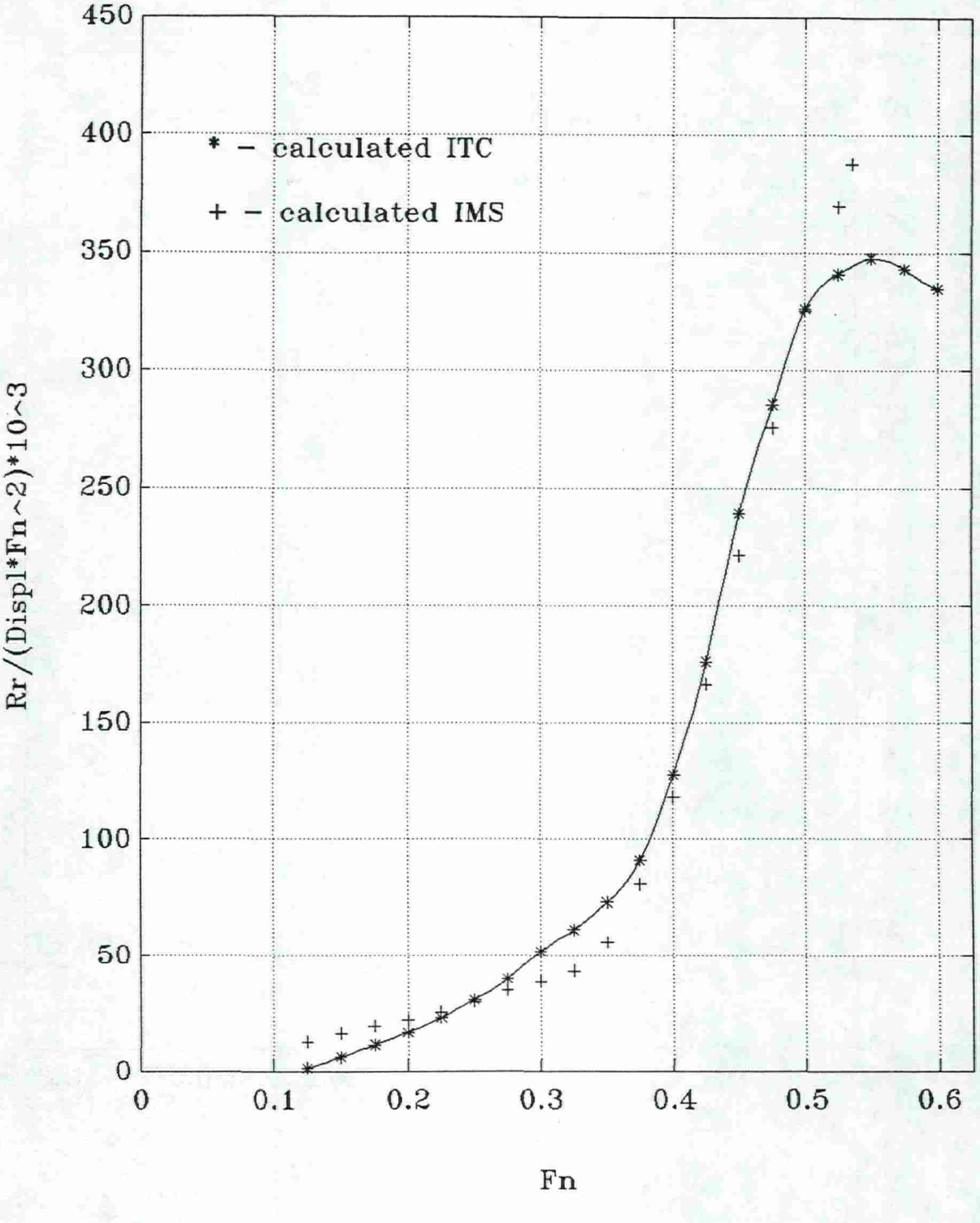
Hull 16



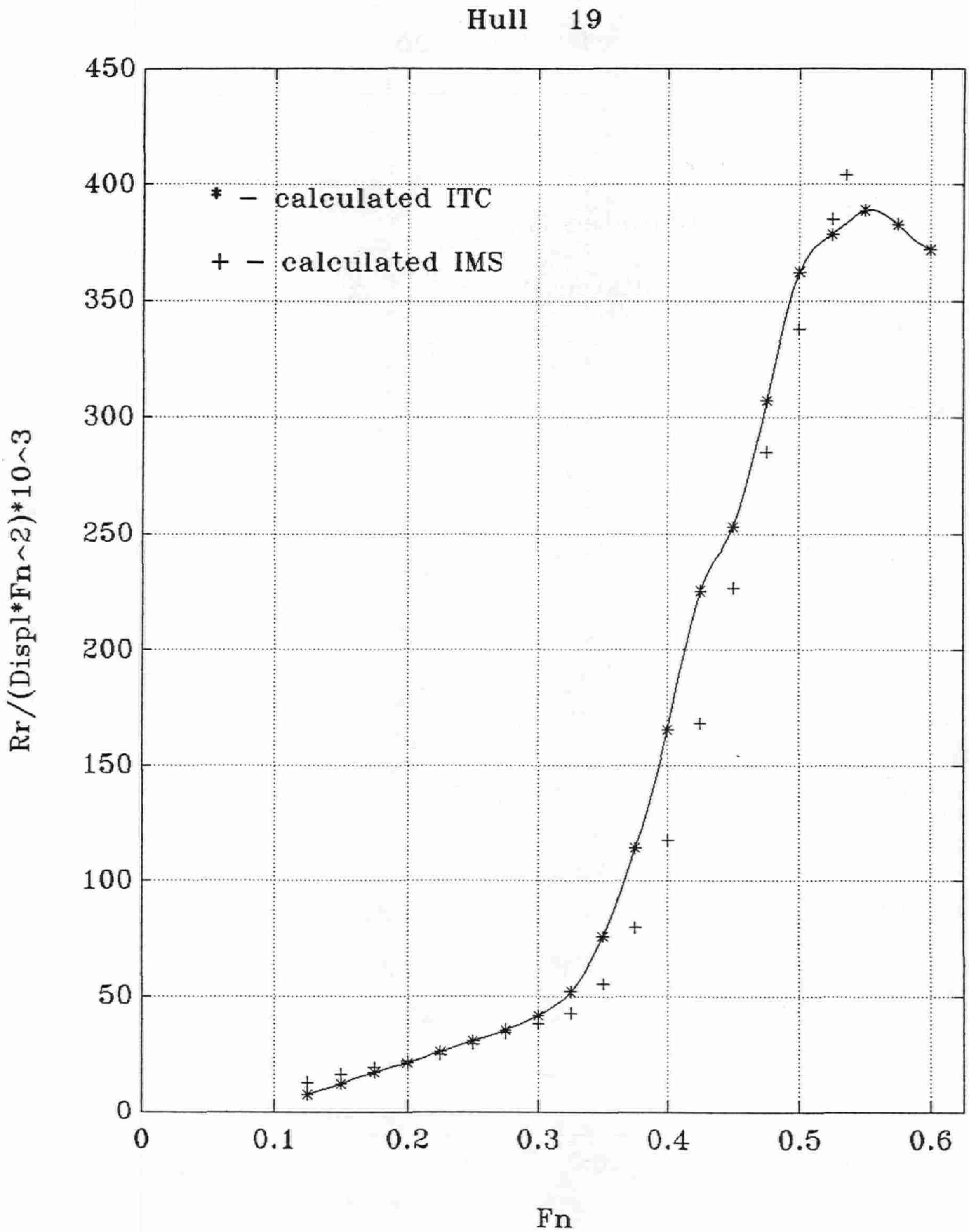
450
400
350
300
250
200
150
100
50
0
Rr/(Displ*Fn^2)*10^3
* - calculated ITC
+ - calculated IMS
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn

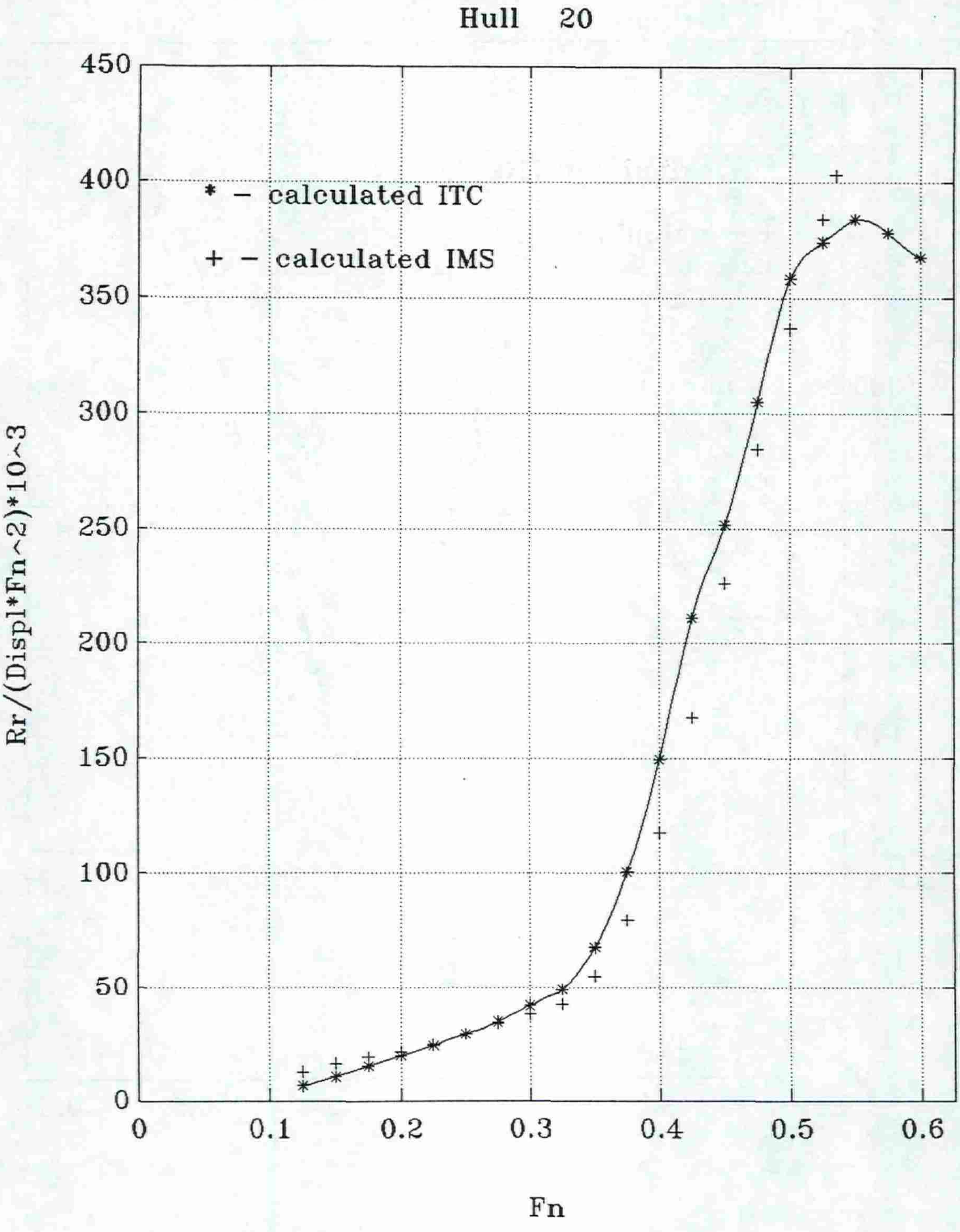

Hull 17
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

Hull 18

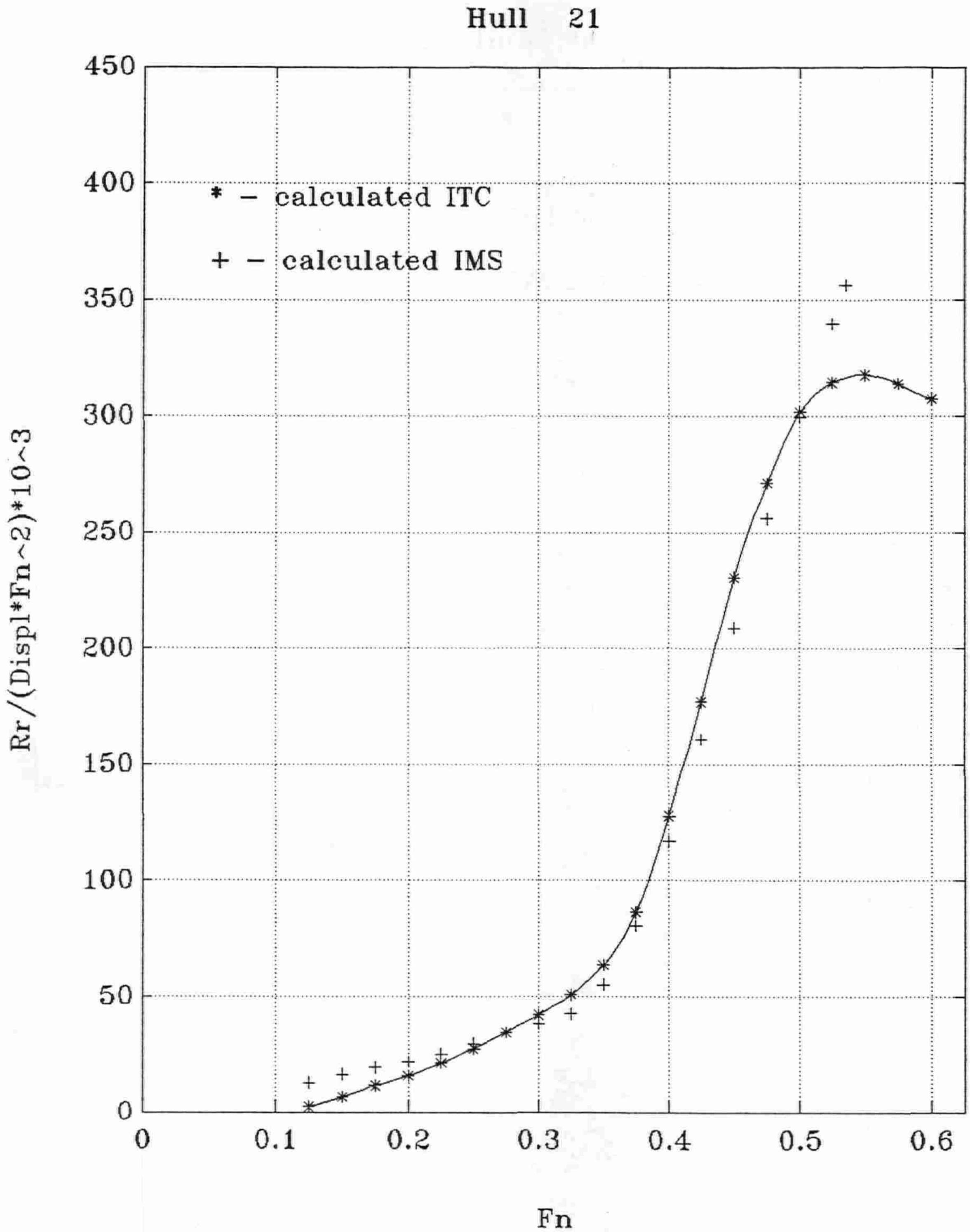


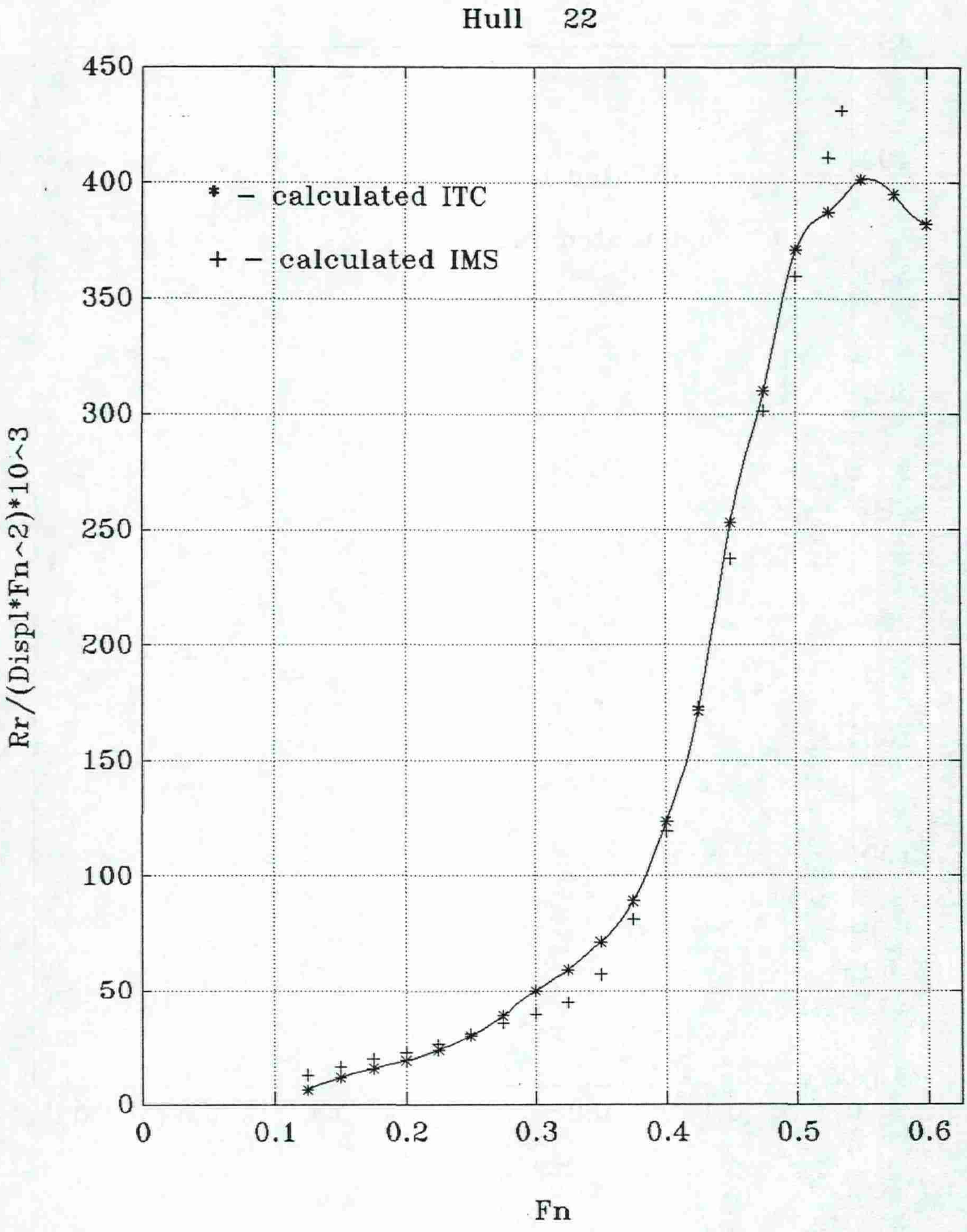
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6


Hull 19
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

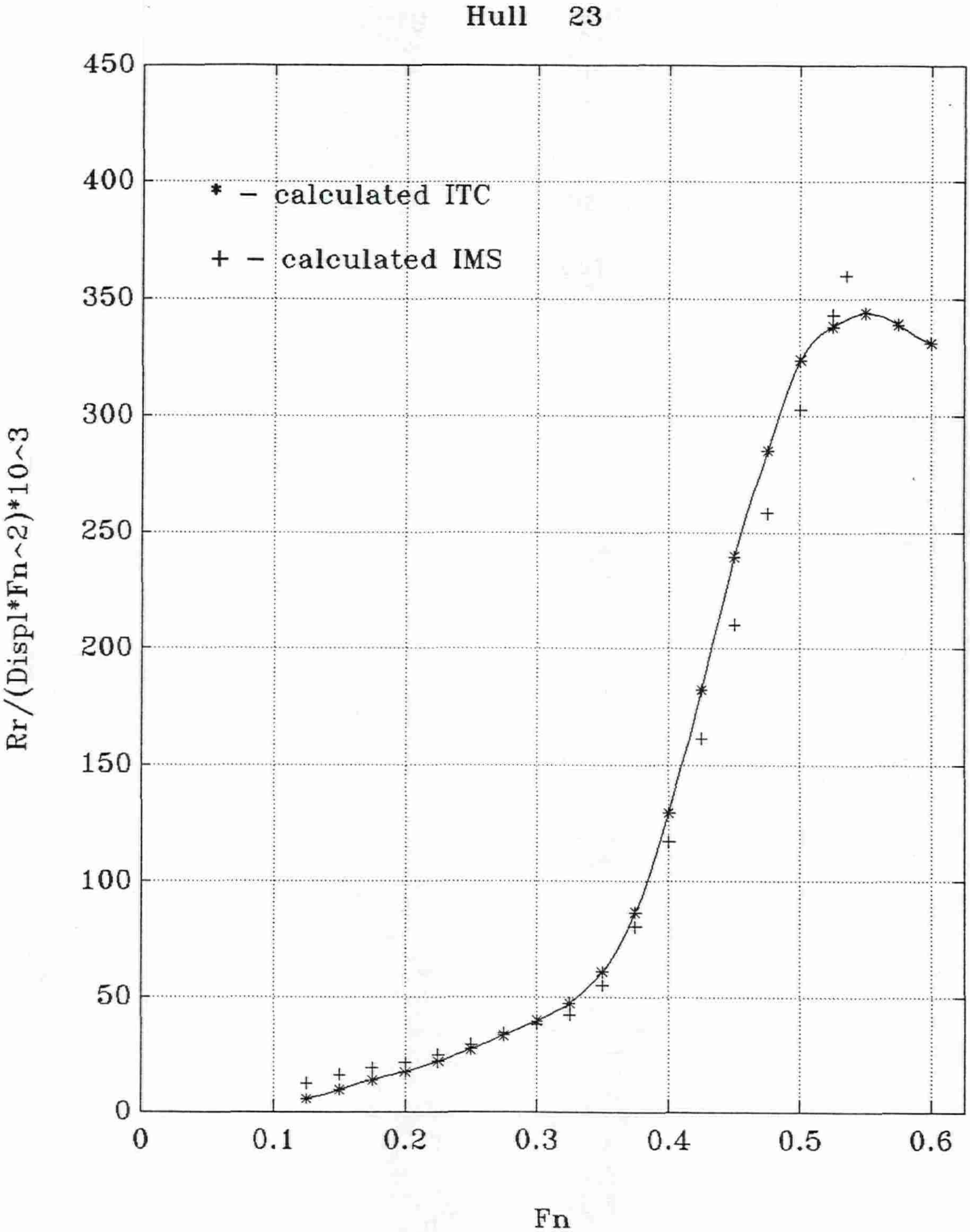


Hull 20
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

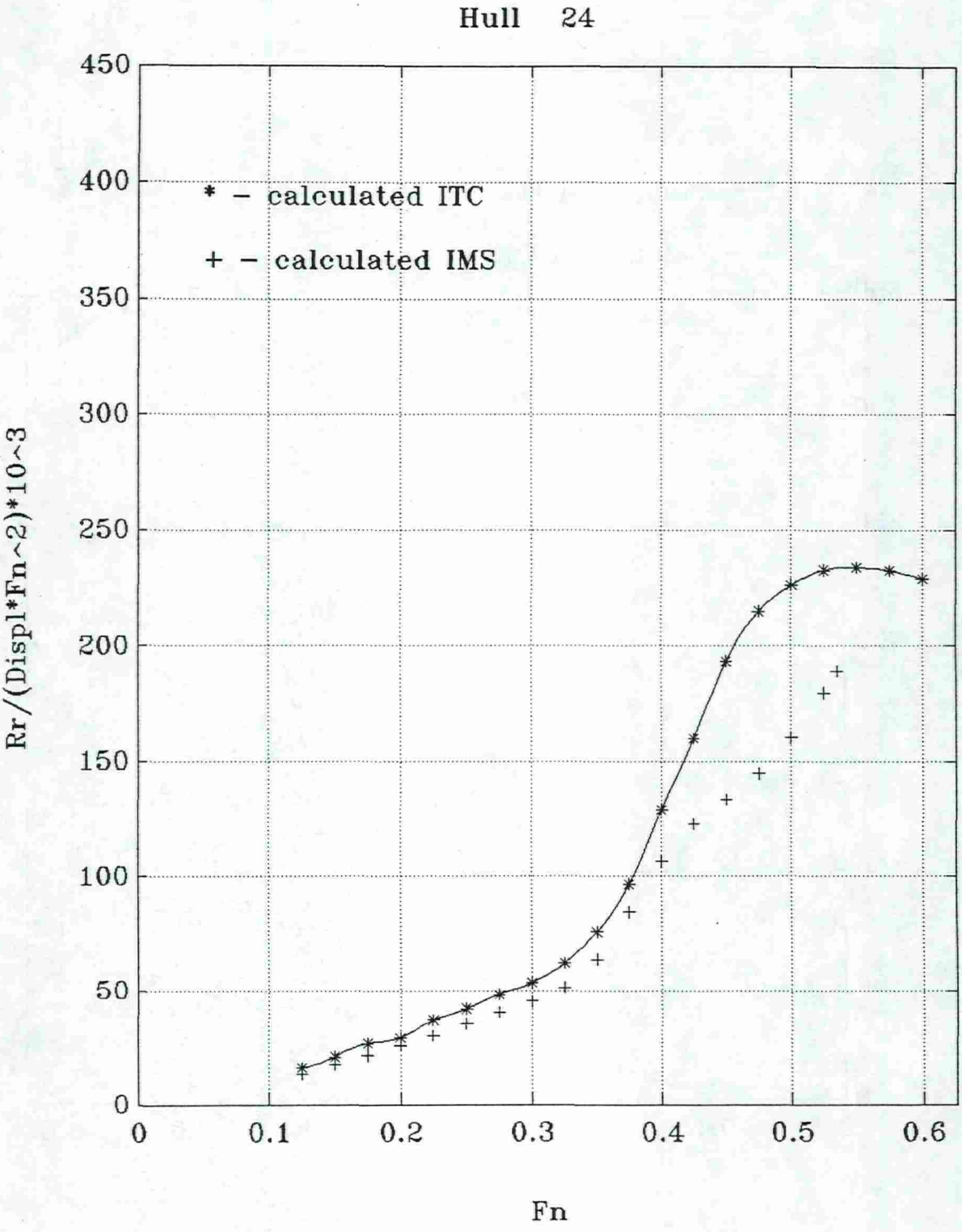

Hull 21
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Fn



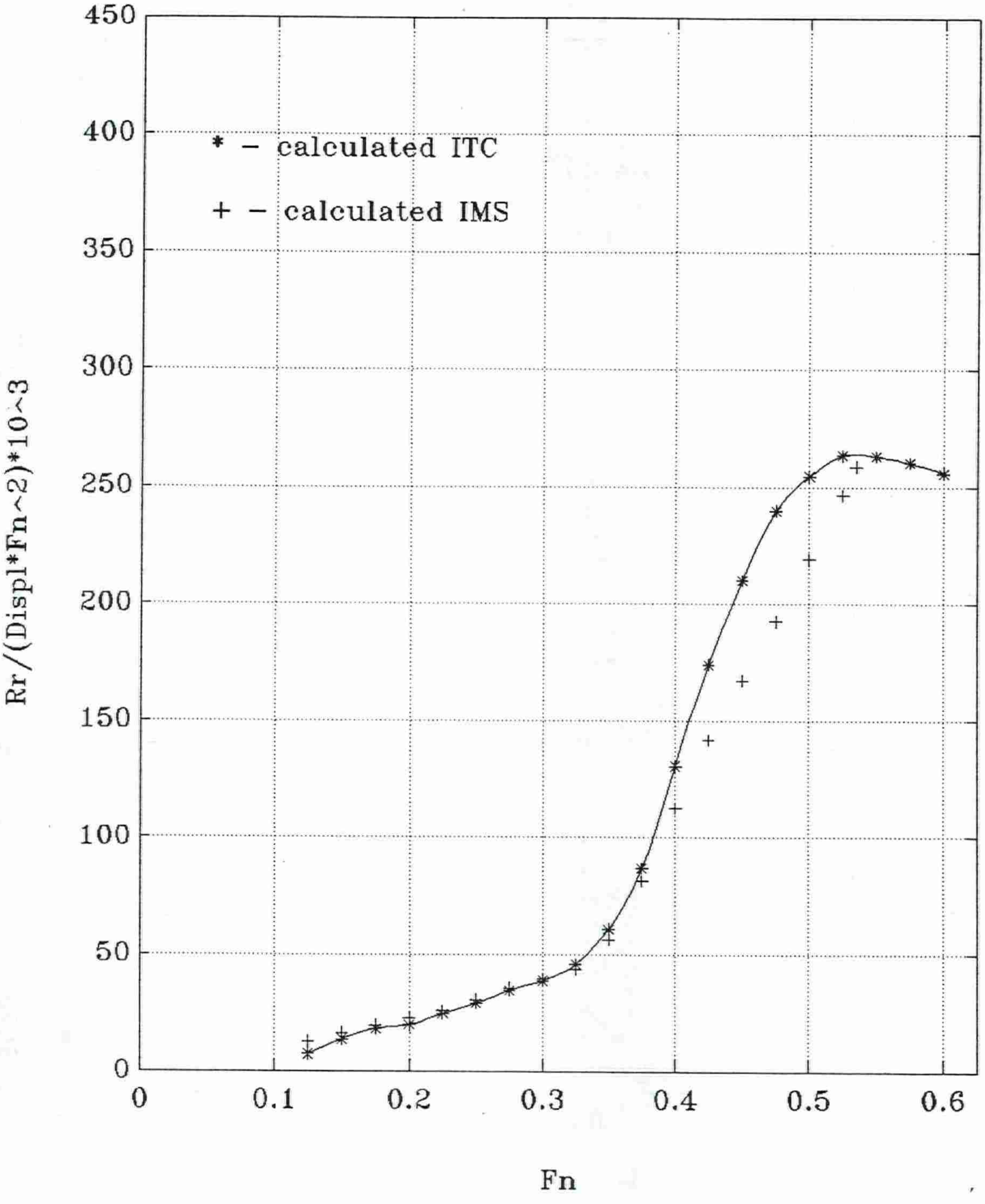
Hull 22
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0.1
0.2
0.3
0.4
0.5
0.6



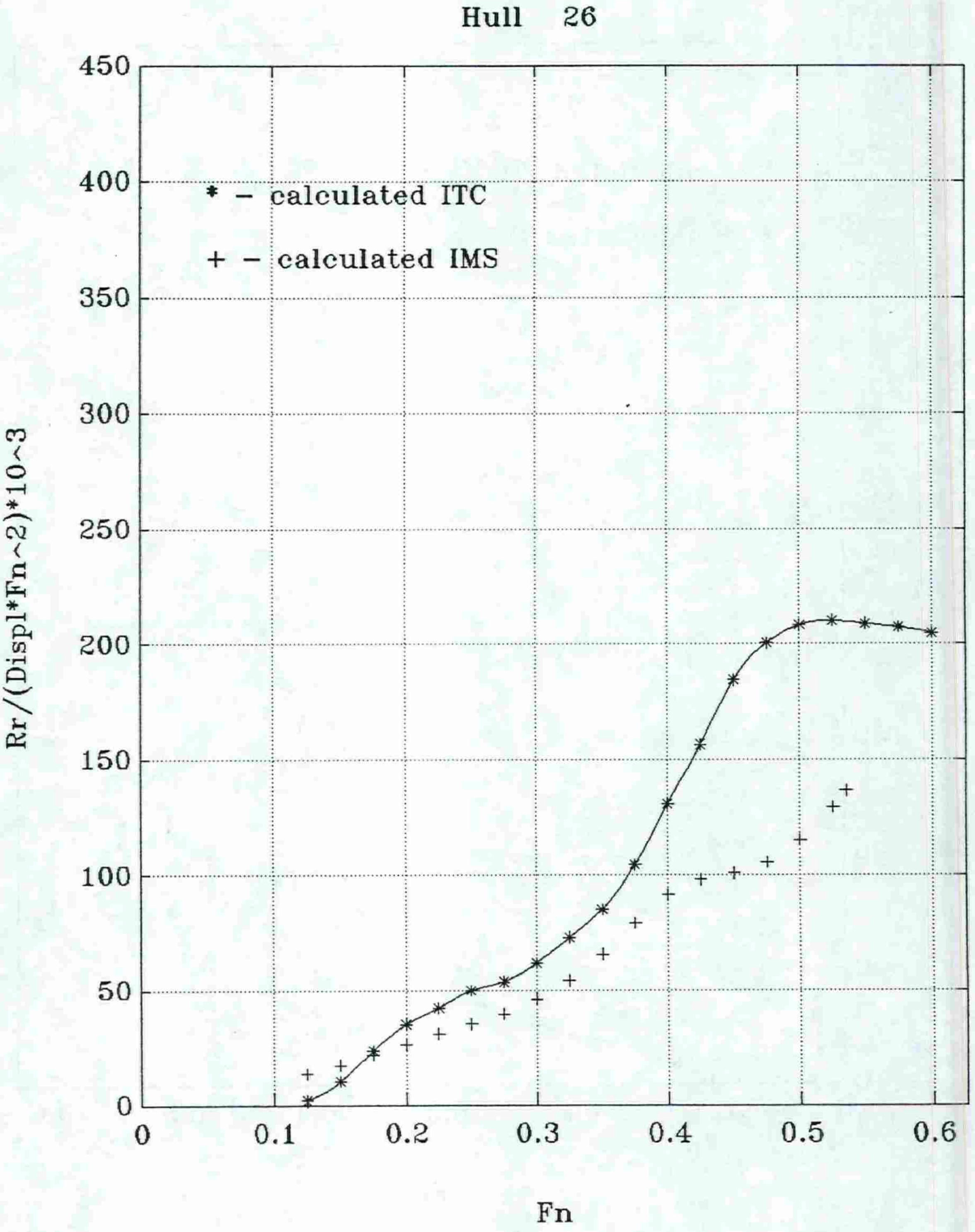
Hull 23
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6


Hull 24
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6

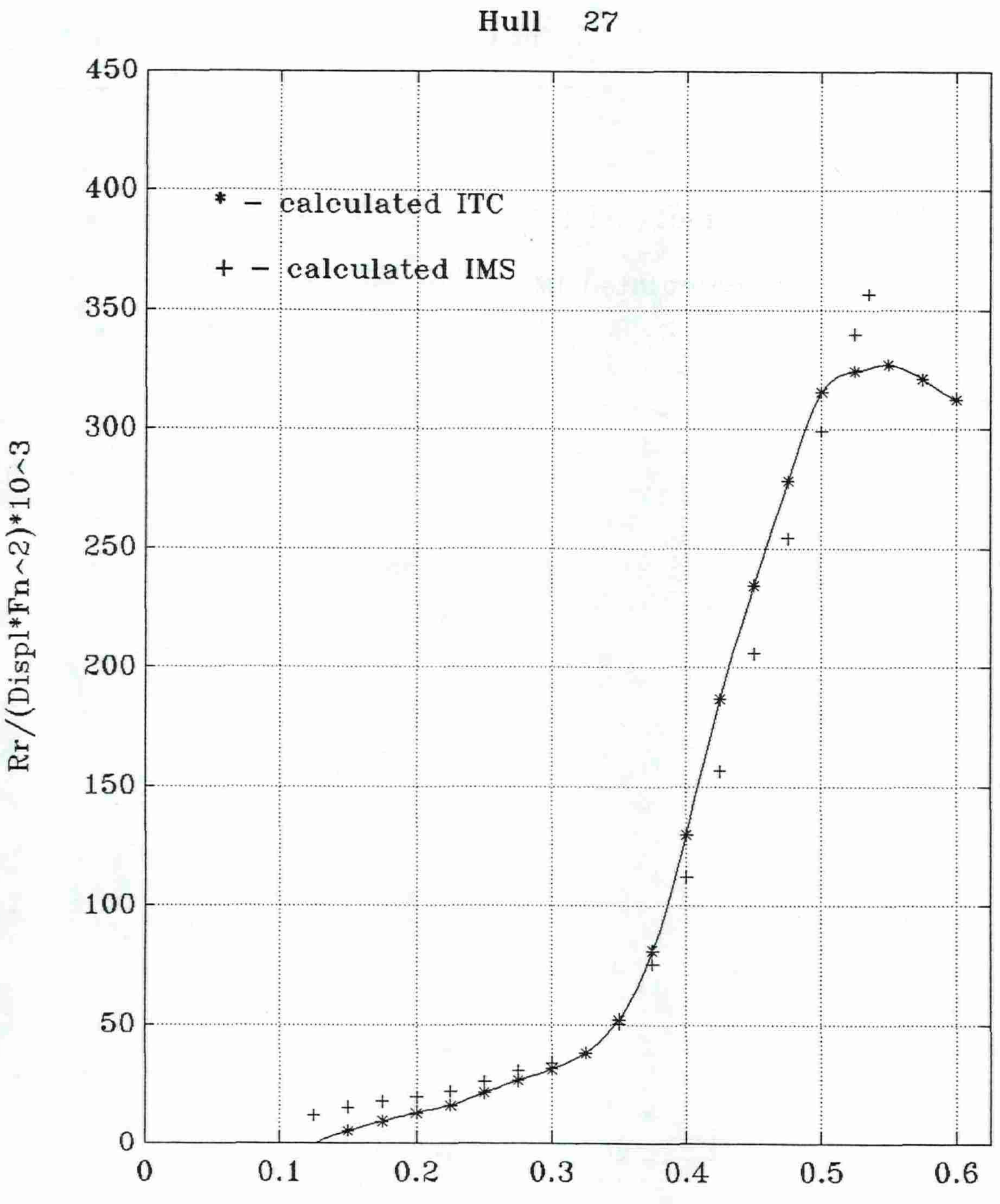
Hull 25



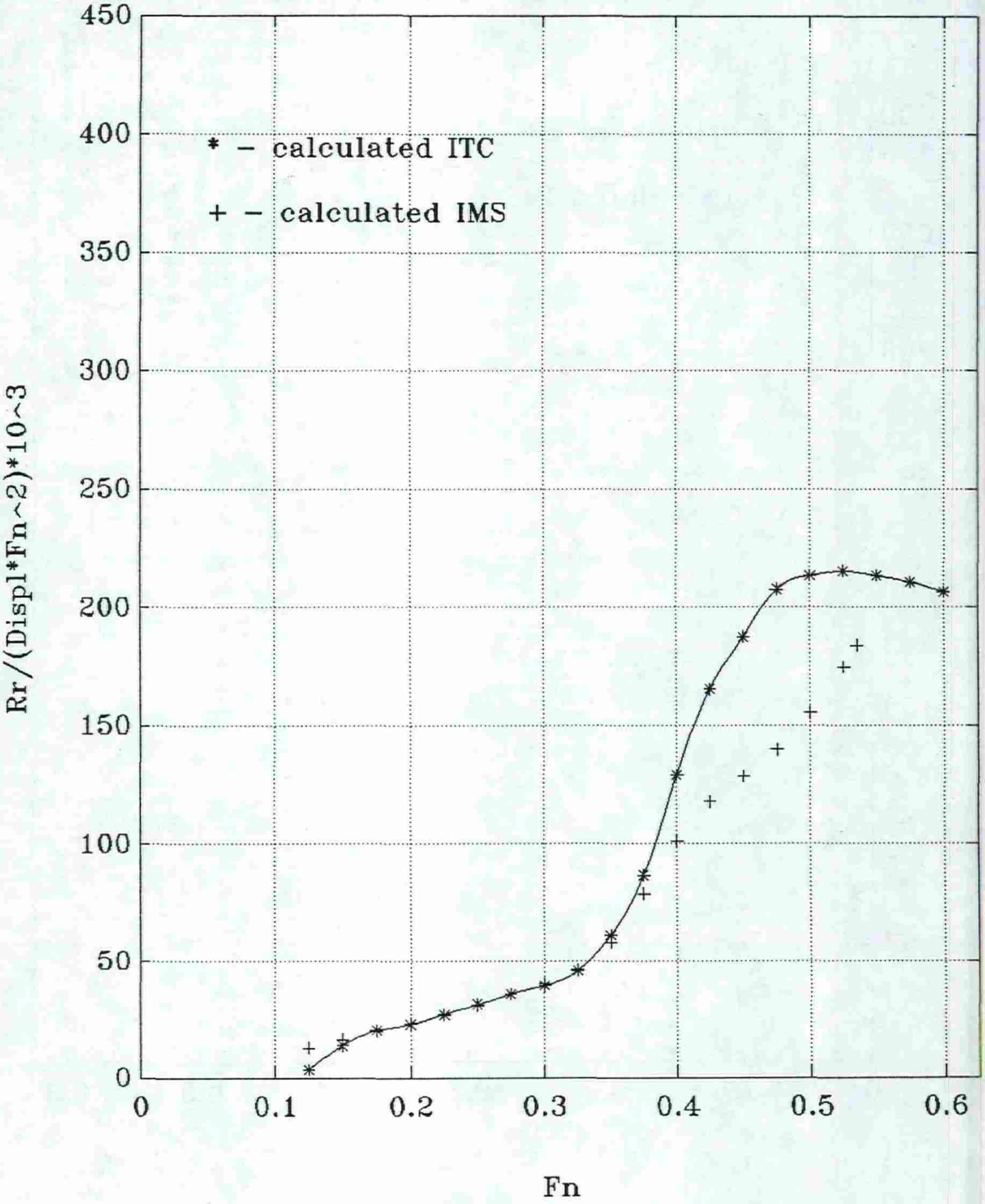
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6
* – calculated ITC
+ – calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn



Hull 26
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
450
400
350
300
250
200
150
100
50
0
0
0.1
0.2
0.3
0.4
0.5
0.6


Hull 27
* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0
0.1
0.2
0.3
0.4
0.5
0.6

Hull 28



* - calculated ITC
+ - calculated IMS
Rr/(Displ*Fn^2)*10^3
Fn
0
50
100
150
200
250
300
350
400
450
0.1
0.2
0.3
0.4
0.5
0.6