

# Predictions of the Resistance and Squat of the NPL 5d and NPL 5e Model Hulls

L. Lazauskas, Cyberiad, leo@cyberiad.net  
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## Summary

Predictions of resistance and squat of NPL 5d and NPL 5e are compared to measured values. We also show comparisons with the NPL 5b and GMS 050 hulls.

## Notes

The NPL 5d and 5e hulls were devised by Molland and Lee [1]. Robards used the hulls in his thesis [2]. Technically, the 5d and 5e hulls are not members of the systematic series of NPL hulls.

## Geometry

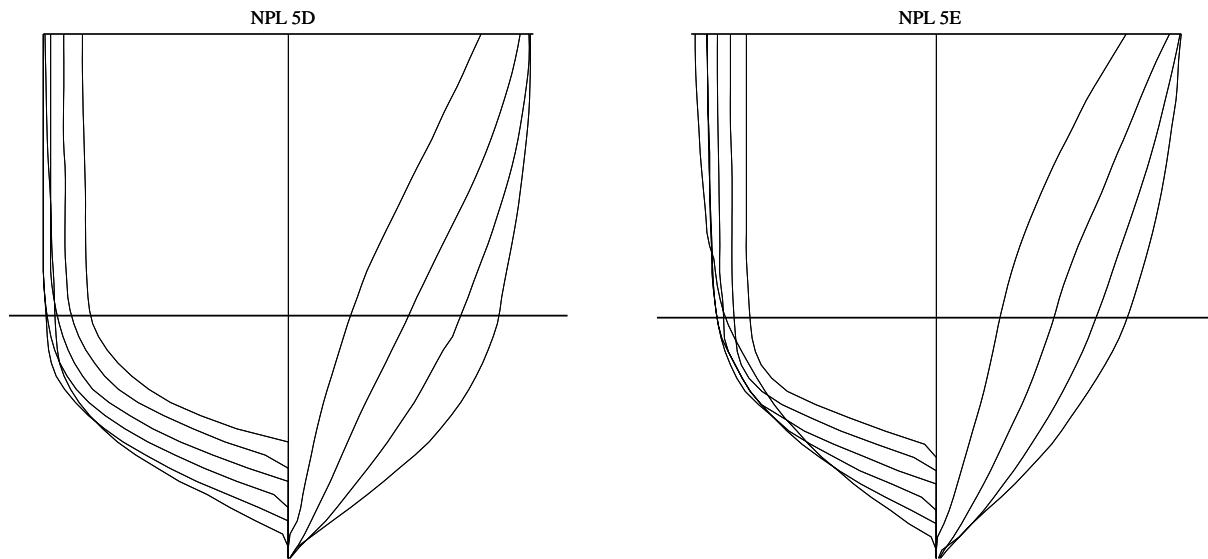


Figure 1: Hull body plans: NPL 5d (left) and NPL 5e (right).

## References

- [1] Molland, A.F. and Lee, Adrian R., “Resistance experiments on a series of high speed displacement catamaran forms: variation of prismatic coefficient”, Ship Science Report, No 76, University of Southampton, Feb. 1995.
- [2] Robards, Simon William, “The hydrodynamics of high-speed transom-stern vessels”, *M. Engineering thesis*, The University of New South Wales, Nov. 2008.

Model	$L$ (m)	$L/B$	$B/T$	$C_{\nabla}$	$C_B$	$C_M$	$C_P$	$C_{VP}$	$C_{WP}$	$S/L^2$	$B_T/B$	$T_T/T$	$C_{AT}$
NPL 5d	1.600	11.0	2.00	8.49	0.396	0.603	0.654	0.524	0.756	0.107	0.814	0.512	0.693
NPL 5e	1.600	11.0	2.00	8.47	0.398	0.532	0.732	0.517	0.770	0.108	0.846	0.526	0.726
NPL 5b	1.600	11.0	2.00	8.48	0.396	0.573	0.685	0.522	0.759	0.108	0.820	0.512	0.720
GMS 050	1.524	11.0	2.65	8.50	0.523	0.759	0.684	0.689	0.759	0.101	0.822	0.630	0.783

Table 1: Principal geometric particulars.

	$x_B/L$	$z_B/T$	$x_F/L$	$1000I_L/L^4$	$1000I_T/L^4$	$\overline{\text{GM}}_{\text{L0}}/L$	$\overline{\text{GM}}_{\text{T0}}/B$
NPL 5d	0.0652	-0.309	0.086	4.57	0.037	2.78	0.092
NPL 5e	0.0633	-0.306	0.084	4.75	0.038	2.87	0.100
NPL 5b	0.0638	-0.313	0.084	4.60	0.037	2.80	0.090
GMS 050	0.0635	-0.379	0.084	4.60	0.037	2.81	0.106

Table 2: Principal hydrostatic particulars.

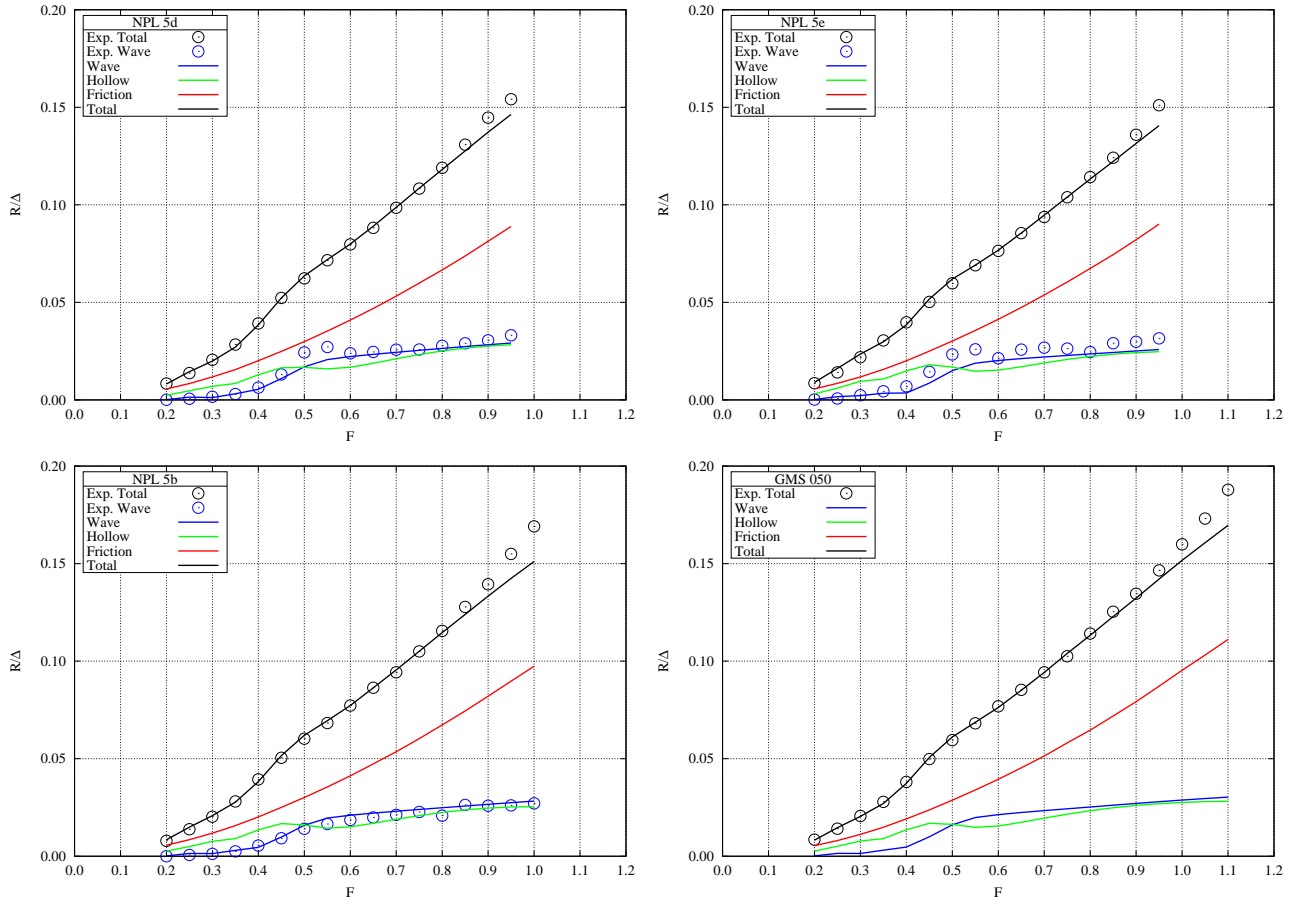


Figure 2: Total specific resistance and resistance components of the NPL 5d (top left), NPL 5e (top right), NPL 5b (bottom left), and GMS 050 (bottom right).

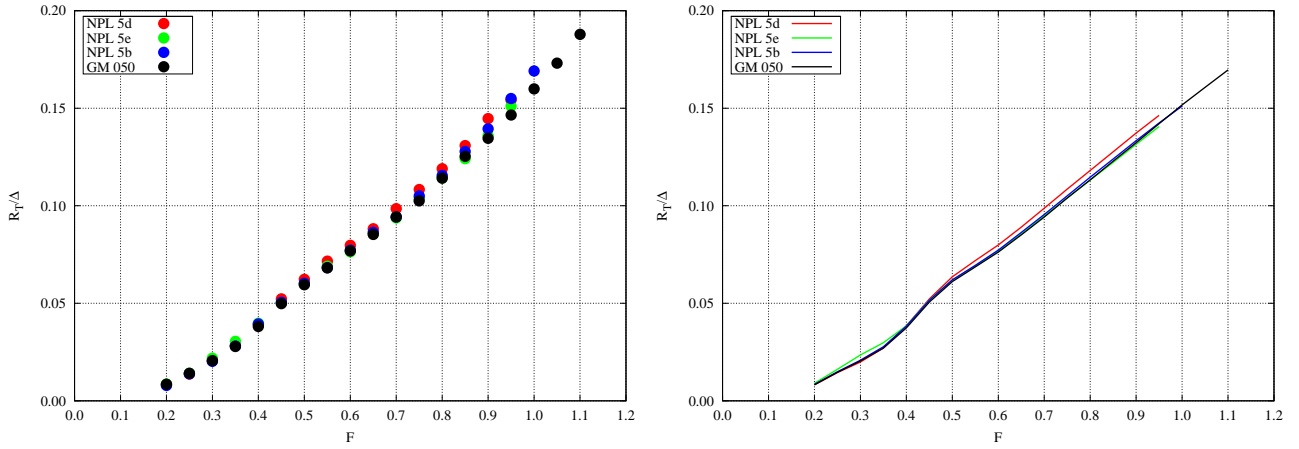


Figure 3: Total specific resistance: measured (left) and predicted (right).

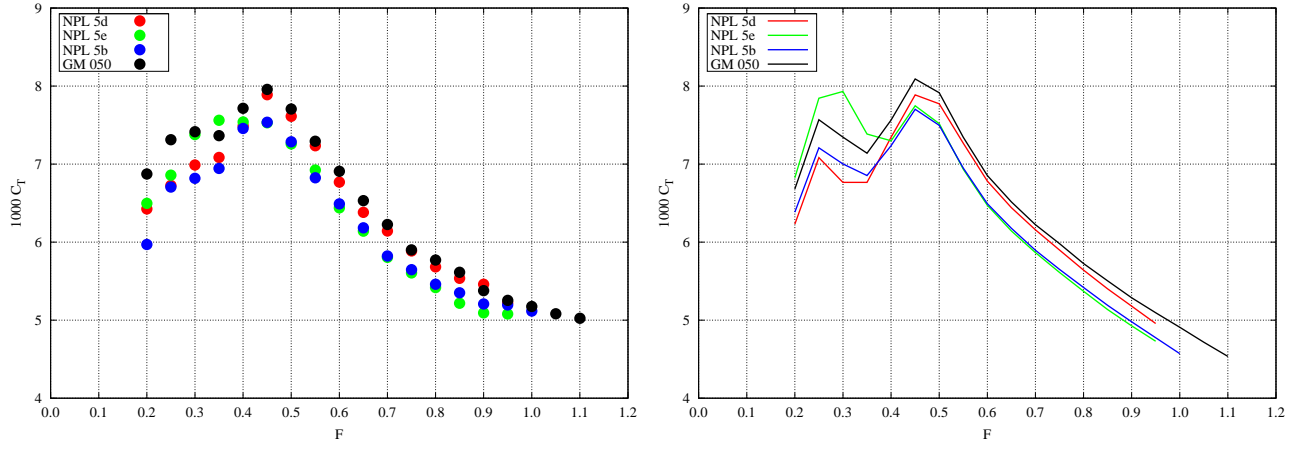


Figure 4: Total resistance coefficients: measured (left) and predicted (right).

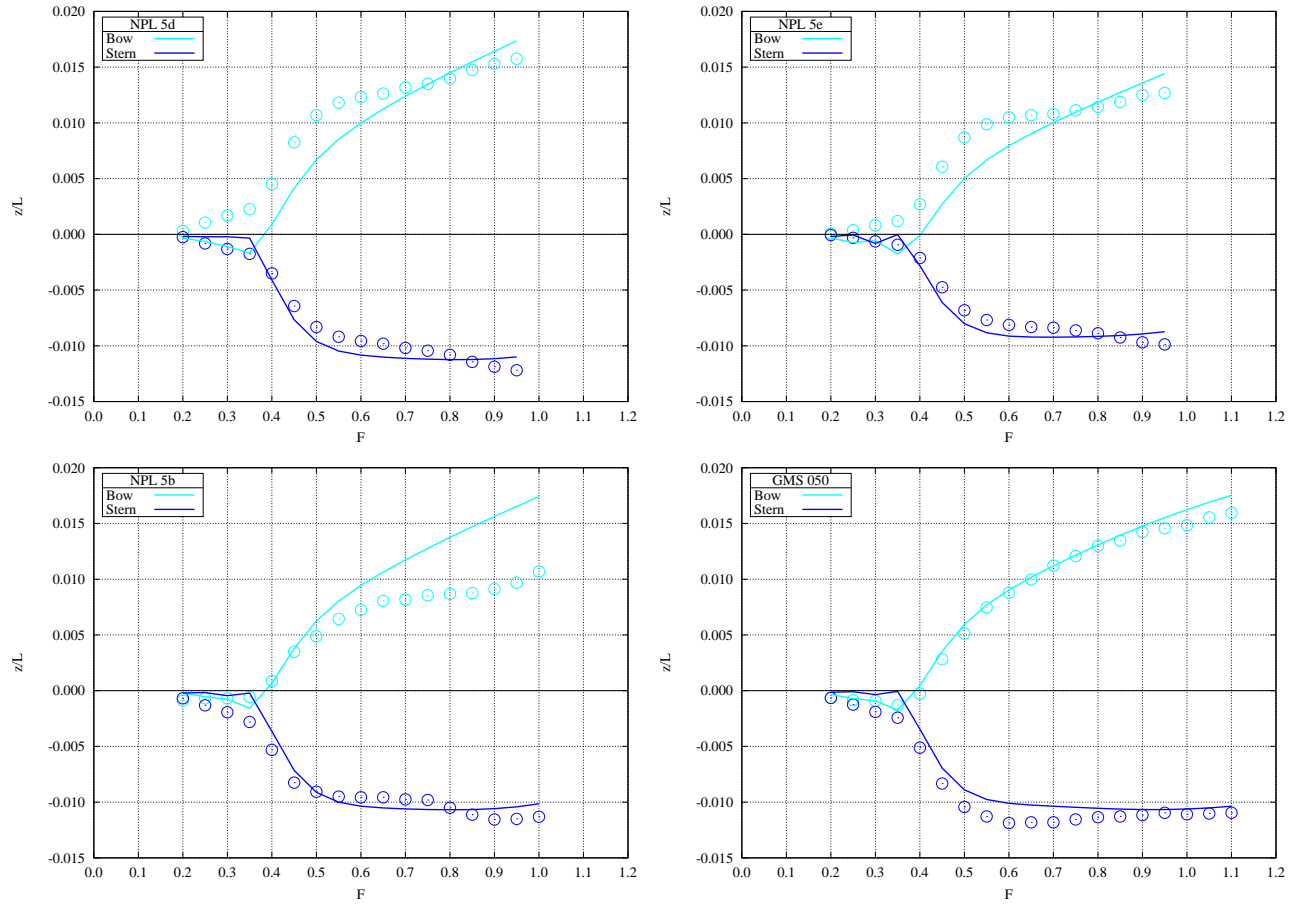


Figure 5: Squat of the NPL 5d (top left), NPL 5e (top right), NPL 5b (bottom left), and GMS 050 (bottom right).