Squat Formula for Cape-Size Bulk Carriers Based on Towing Tank Results and Full-Scale Measurements

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Abstract *On behalf of the Common Nautical Authority, Flanders Hydraulics Research and Ghent University analysed the squat behaviour of cape-size bulk carriers based on both full-scale measurement and towing tank results.*

The full-scale measurements focused on seven inbound cape-size bulk carriers (drafted approximately 16.5 m) to the port of Flushing/Vlissingen (NL). The voyages of this type of vessels corresponded with small under keel clearances (to a minimal value of 16%) and exposed wave conditions (with a wave height up to 2.6 m). By filtering steady and unsteady motions the motions related to squat and seakeeping were split.

Furthermore, Flanders Hydraulics Research performed a comprehensive test program in the towing tank for manoeuvres in confined water, with a scale model (at scale 1/75) very similar to the ships tested at full-scale. This test program provides squat data at different ship speeds and propeller rates and for four under keel clearances varying between 10% and 100% of the ship's draft.

Based on the squat measurements in the towing tank a squat formula was developed. This formula was applied on the conditions present during the full-scale measurements in order to compare the squat behaviour to the towing tank results and between the different vessels tested at full-scale.

Keyword*: Squat; Towing Tank, Full-Scale Measurements, Bulk Carrier*