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Hydrodynamic Force Chracteristics on Maneuvering of Pusher-Barge Systems

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Summary: Pusher-barge systems in nine different combinations were studied in this paper. Captive model tests were performed on various pusher-barge combinations in Hiroshima University Towing Tank. Hydrodynamic derivatives of the various combinations were captured through the model tests and compared with Inoue's formula for estimating linear hydrodynamic derivatives. It is found that Inoue's formula is insufficient in estimating N'_r for pusher-barge system when ship's breadth is not taken into consideration. At service speed 7 knots, pusher-barge systems with the same number of barges but arranged in-row (same LOA but larger breadth) require more power to operate than those that are arranged in-line (same breadth but larger LOA). When LOA increases, advance and transfer distance required for turning increase as well, mainly due to the significant increment of moment of inertia when barges are arranged in-line than in-row.