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Model Experiments on Extreme Motions of a Wave-Piercing Tumblehome Vessel in Following and Quartering Waves

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Summary: This paper reports model experiments of a wave-piercing tumblehome hull in following and quartering waves for examining the applicability of a system-based simulation model proposed by the authors to stability of an unconventional ship. In captive model experiments, the wave-induced surge force and roll restoring moment were measured and confirmed that conventional hydrodynamic prediction methods are applicable. In free-running model experiments, broaching and stable surf-riding were frequently realised. Here the maximum roll angle due to the severe yaw motion is about 70 degrees. The existing simulation model is compared with these experiments. The comparison shows that the current simulation well estimates boundary between the oscillatory motion and non-oscillatory ones such as surf-riding and broaching but it underestimates the yaw motion and overestimates the roll motion.

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