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Coupled level-set CURVIB method for fluid-structure interaction simulations of arbitrarily complex floating rigid bodies[1] ANTONI CALDERER, SEOKKOO KANG, FOTIS SOTIROPOULOS, St. Anthony Falls Laboratory, University of Minnesota — We develop a fluid-structure interaction (FSI) model for simulating arbitrarily complex floating rigid bodies interacting with nonlinear free-surface flows. The FSI curvilinear immersed boundary (CURVIB) method of Borazjani et al. (JCP 2008) is integrated with the LES CURVIB method of Kang et al. (Adv. in Water Resources 2010) and the recently developed level set-CURVIB method (Kang and Sotiropoulos, Adv. in Water Res. 2012) to develop a powerful method for simulating 3D nonlinear turbulent free-surface flows. To demonstrate the predictive capabilities of the method and its ability to simulate non-linear free-surface phenomena, such as breaking waves, we apply it to simulate various cases involving 2D/3D free surface-rigid body interactions. The computed results are shown to be in excellent agreement with available experimental measurements.

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