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Large Eddy Simulation of Ducted Propulsors in Crashback¹ HYUNCHUL JANG, KRISHNAN MAHESH, Aerospace Engineering, University of Minnesota — Flow around a ducted marine propulsor is computed using the large eddy simulation methodology under crashback conditions. Crashback is an operating condition where a propulsor rotates in the reverse direction while the vessel moves in the forward direction. It is characterized by massive flow separation and highly unsteady propeller loads, which affect both blade life and maneuverability. The simulations are performed on unstructured grids using the discrete kinetic energy conserving algorithm developed by Mahesh at al. (2004, J. Comput. Phys 197). Numerical challenges posed by sharp blade edges and small blade tip clearances are discussed. The flow is computed at the advance ratio J=-0.7 and Reynolds number Re=480,000 based on the propeller diameter. Average and RMS values of the unsteady loads such as thrust, torque, and side force on the blades and duct are compared to experiment, and the effect of the duct on crashback is discussed.

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