Abstract Submitted
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LES of the flow around a marine propeller[1] MARTIN VYSOHLID, KRISHNAN MAHESH, University of Minnesota — LES of the flow around a marine propeller, in the crashback mode of operation is performed. Crashback refers to the mode where the propeller rotates in the reverse direction while the vessel moves in the forward direction. It is characterized by massive flow separation and unsteady propeller loads, which affect both blade life, and maneuverability. The simulations are performed in a rotating frame of reference on unstructured grids using the algorithm developed by Mahesh at al. (2004, J. Comput. Phys. 197). The flow is computed for as long as 300 propeller revolutions at experimental Reynolds number, in order to resolve low frequency fluctuations of thrust, torque and side-forces on the propeller. Their average and rms values, and power spectral density show good agreement with experiment. The circumferentially averaged flow is also in good agreement with experiment for mean and turbulence quantities. A prominent feature of the flow is a ring vortex that is highly unsteady. The ring vortex will be used to explain the fluctuating loads on the propeller. Also, a simplified model will be discussed, where the propeller is replaced by an actuator disk.

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