Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

LES of a ducted propeller with rotor and stator in crashback
HYUNCHUL JANG, KRISHNAN MAHESH, University of Minnesota — A sliding
interface method is developed for large eddy simulation (LES) of flow past ducted
propellers with both rotor and stator. The method is developed for arbitrarily
shaped unstructured elements on massively parallel computing platforms. Novel
algorithms for searching sliding elements, interpolation at the sliding interface, and
data structures for message passing are developed. We perform LES of flow past
a ducted propeller with stator blades in the crashback mode of operation, where
a marine vessel is quickly decelerated by rotating the propeller in reverse. The
unsteady loads predicted by LES are in good agreement with experiments. A highly
unsteady vortex ring is observed outside the duct. High pressure fluctuations are
observed near the blade tips, which significantly contribute to the side-force. This
work is supported by the United States Office of Naval Research.

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Date submitted: 03 Aug 2012   Electronic form version 1.4