Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Large Eddy Simulation of Free-Surface Flow past a Submerged Submarine Fairwater at Moderate Reynolds Number ZAHEER IKRAM, ELDAD AVITAL, JOHN WILLIAMS, Queen Mary University of London — The affects of reducing submergence depth around a submerged submarine fairwater without its associated appendages is numerically studied using Large Eddy Simulation. The submerged body is modelled using a immersed boundary method, whilst the free-surface is accounted for using a moving mesh. The numerical simulations are performed at a Reynolds number of 8×10^4 for a submergence ratio in the range of 0.44-0.32 and for Froude numbers < 1. Both the statistical and structural behaviour of the flow are examined. Statistically, time averaged velocity profiles, turbulence intensities, kinetic energy spectra and budgets have shown that the major part of the turbulence is confined to the near wake region of the fairwater. Structurally, no vortices are found to show significant rise or interaction with the free-surface, whilst in the wake vortices are found to be present for over 50% of the total monitored period. Reducing the submergence depth is found to influence the tip vortex. In all cases, the surface waves generated by the submerged fairwater are of a Kelvin kind.

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Date submitted: 03 Aug 2011 Electronic form version 1.4