Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

**Air Bubble Entrainment by Breaking Ship Bow Waves**[1] M. TAVAKOLINEJAD, M. SHAKERI, D. HADSCHIEV, J.H. DUNCAN, University of Maryland — Air entrainment induced by breaking bow waves simulated with a 2D+T technique was studied experimentally in a tank that is 14.8m long, 1.15m wide, and 2.2m deep with a water depth of 1.85m. In the 2D+T technique, a two-dimensional wave maker moves horizontally and deforms in a manner that approximates the time varying intersection of one side of the hull of the three-dimensional ship and a fixed vertical plane oriented normal to the ship's path. The experiments were performed in simulated seawater and the bubble sizes and velocities in the streamwise plane were measured with a double-pulsed shadowgraph technique. In cases with plunging breakers, the primary mechanisms for air entrainment are the entrapment of a tube of air in the crest during the impact of the plunging jet and the turbulent fluid motion in the splash region create by the plunging jet impact. Two equivalent ship model forward speeds, one with a very weak plunging breaker and one with a very strong plunging breaker, were studied. Bubble size distributions, void fractions and bubble velocity distributions at times corresponding to the passage of the ship stern will be presented.

[1]This work is supported by the Office of Naval Research under grant number N000140810372. Scientific Officer Dr. P. Purtell.

James Duncan
University of Maryland

Date submitted: 08 Aug 2009 Electronic form version 1.4