

Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Flushing of passive contaminants through ship ballast tanks

ZHIXIN QI, IAN EAMES, ALISTAIR GREIG, Department of Mechanical Engineering, University College London, EAMES RESEARCH GROUP TEAM — Ballast water is taken up in ports and carried by ships to maintain balance, trim, and structural integrity. Since the volume of ballast water taken up is significant, it is likely that aquatic species are taken into the tank and transported to another ecosystem. To prevent damage to ecosystems, the International Maritime Organization's Ballast Water Management Convention requires that ballast water tanks must be pumped through with at least three volumes, less is permissible if it can be demonstrated that at least a 95% of initial water is exchanged. The purpose of this talk is to examine how the exchange process depends on the geometrical complexity of the ballast tank and the density contrast between the initial ballast water and the water used for flushing. These physical processes are studied using a new mathematical model to describe flushing of contaminants from a ballast tank based on models of transport in multiroom buildings. A series of laboratory tests were undertaken using an acrylic model of a 2 to 20 compartmented ballast tank to examine the flushing of a dye from each compartment. The agreement between the theoretical and experimental results is good. These results are finally discussed in the context of international regulations for flushing ballast tanks.

Zhixin Qi

Department of Mechanical Engineering, University College London

Date submitted: 12 Aug 2012

Electronic form version 1.4