Predicting the Drag on Ships with Biofouling

5 November 2019 / Reed Hall, Room 102 / 1200–1300

With Guest Dr. Karen Flack

Former Chair and current faculty member in the Mechanical Engineering Department at the United States Naval Academy, and visiting professor while on sabbatical at NPS.

Dr. Karen Flack

Abstract

Biological growth on ships causes a significant increase in power requirements resulting in increased fuel use and reduced performance. An economic analysis from 2011 of US Navy destroyers places the overall cost associated with hull fouling at $1 million per ship per year. A better understanding of the drag penalty would inform the Navy on the economic benefit of a reduced time between hull cleaning cycles. Experimental results of the increased friction drag due to bio-fouling will be presented. Engineering correlations to predict the increased drag based on biofouling types and roughness morphology, including in-situ measurements, will be also be discussed.

Biography

Karen A. Flack is a Professor in the Mechanical Engineering Department at the United States Naval Academy in Annapolis, Maryland. She received a bachelor's degree from Rice University, a master's degree from the University of California, Berkeley and a Ph.D. from Stanford University, all in Mechanical Engineering. Professor Flack teaches courses in thermodynamics, fluid mechanics, heat transfer, as well as wind and tidal power. Her research focuses on turbulent boundary layer physics with a concentration on rough wall boundary layers and frictional drag prediction. Recent work also includes performance characteristics of tidal turbines in unsteady flow conditions. She is on the editorial boards of the *International Journal of Heat and Fluid Flow* and *Flow Turbulence and Combustion.* She is a Fellow of the American Physical Society and has received the following: an American Society of Mechanical Engineering award for best paper in the *Journal of Fluids Engineering,* a Pi Tau Sigma teaching award, the Naval Academy Research award and United States government meritorious service medals.

NPS

NAVAL POSTGRADUATE SCHOOL