

Abstract Submitted  
for the DFD10 Meeting of  
The American Physical Society

**Interaction of a circumferentially varying stator row upstream of a propeller in a uniform flow**<sup>1</sup> JOHN FARNSWORTH, MICHAEL AMITAY, Rensselaer Polytechnic Institute, DAVID BEAL, STEPHEN HUYER, Naval Undersea Warfare Center, RPI TEAM, NUWC TEAM — A propulsor capable of producing maneuvering forces in all directions effectively eliminates the need for additional control surfaces. Side forces can be generated by the propeller through the variation of the inflow swirl velocity to a conventional propeller. These control forces are generated based on the same geometric principles as a helicopter swash-plate. Instead of cyclically adjusting the propeller blade pitch angle, the relative pitch angle of a fixed pitch propeller is cyclically altered through a pre-swirled inflow generated by an upstream stator row. Wind tunnel and water tunnel experiments were conducted where surface static pressure, forces and moments, and stereoscopic PIV measurements were conducted on a simplified propulsor model. From these measurements a better understanding of the fluidic interactions of the complex propeller system was achieved.

<sup>1</sup>Supported by ONR

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Date submitted: 03 Aug 2010

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