



News Release

Defense Advanced Research Projects Agency

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IMMEDIATE RELEASE

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BREAKTHROUGH COULD LEAD TO REDUCED DRAG FOR SHIPS

The Defense Advanced Research Projects Agency (DARPA) today announced important scientific breakthroughs that could lead to reduced drag for future Navy and commercial ships. Reducing drag has significant implications for decreased fuel consumption as well as increased payload capacity, range, and endurance.

It has been known for decades that adding polymers or microbubbles to the flow of water around flat plates can reduce friction drag by as much as 80 percent at laboratory scales. Despite such promising results, however, the use of additives has never been reduced to practice in shipboard systems.

DARPA is undertaking a radically new approach in the Friction Drag Reduction program. The FDR program is developing a multi-scale modeling capability that will allow researchers to run full-scale experiments on a computer, thus more easily discovering the techniques that will bring optimal results.

Using computational techniques that leverage massively parallel computer architectures, researchers in the FDR program have developed the capability to predict from first principles how turbulence is modified by the presence of polymers and microbubbles. Researchers have simulated, for the first time, realistic polymers in turbulent flow. Researchers have also learned that polymers that organize into sheets or filaments produce dramatically enhanced drag reduction. Small-scale experiments with 30-micron bubbles clearly demonstrated for the first time what has long been suspected: like polymers, bubbles must be located within a very thin layer near the wall to be effective.

The results obtained to date in first-principles models and small-scale experiments will permit the next, larger scale models to have much more fidelity and utility. In late Fall 2002 at the Large Cavitation Channel in Memphis, Tenn., the program plans a near-full-scale experiment to validate the large-scale models.

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The results of the experiments and models will be made available to ship designers for use in developing next-generation Navy and commercial ships.

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