

# The 2006 DCAMM Annual Seminar Speaker

## Hassan Aref

Niels Bohr Visiting Professor  
Fluid•DTU and Department of Physics,  
Technical University of Denmark  
and  
Reynolds Metals Professor  
Department of Engineering Science & Mechanics,  
Virginia Polytechnic Institute and State University

will give the lecture:

### 150 Years of Vortex Dynamics

Tuesday, December 19, at 15.00 Hours in Auditorium 72  
Build. 421, Technical University of Denmark, Kgs. Lyngby

The **abstract** of this lecture can be seen on the next page. The lecture aims at popularizing mechanical science to a broad audience of interested DTU students and staff, and engineers from outside DTU.

*The Danish Center for Applied Mathematics and Mechanics, DCAMM is a framework for internationally oriented scientific collaboration between staff members at a number of departments at the Technical University of Denmark and Aalborg University. One of the DCAMM activities is its International Graduate Research School, which is funded in part by the Danish Agency for Science, Technology, and Innovation. The “DCAMM Annual Seminar Speaker” is a new initiative created to disseminate mechanics to a broader audience.*

*For further information on DCAMM, see [www.dcammm.dk](http://www.dcammm.dk).*





**Technical University of Denmark, Building 421, Aud. 72**

**Tuesday, 19 December 2006 at 15:00 hours**

**2006 DCAMM Annual Seminar Lecture:**

## **150 YEARS OF VORTEX DYNAMICS**

by

**Hassan Aref**

**Niels Bohr Visiting Professor, Fluid•DTU and Department of Physics  
Technical University of Denmark  
and**

**Reynolds Metals Professor, Department of Engineering Science & Mechanics  
Virginia Polytechnic Institute and State University, USA**

### **Abstract:**

We are approaching the sesquicentennial of Helmholtz's seminal paper of 1858 in which the study of vortex motion was launched. In this lecture I will give a qualitative description of the laws of vortex motion. I will describe some of the models of vortices that have been studied and the wealth of phenomena that have been addressed using the theory of vortex motion. These include the totally erroneous notion of Kelvin that atoms are a kind of vortex motion in the ether, an idea that led to huge amounts of high quality work even though the application turned out to be misguided. Experiments by the American physicist Mayer on pattern formation by floating magnets were seized upon by Kelvin and his followers as illustrating the periodic table of the elements. Later, in 1911-12, T. von Kármán provided a remarkable application of the vortex dynamics of Helmholtz in his explanation of the structure and stability of bluff body wakes, an application that has stood the test of time. Some 35 years after that, through work by Onsager and Feynman, it was realized that superfluids could nucleate and sustain vortices that obeyed Helmholtz's dynamical equations. In 1979 the first experiments visualizing vortex arrays in rotating superfluid He-4 were reported. Understanding the geometry of the patterns formed by the vortices has been of ongoing interest. Recently, similar patterns have been observed in Bose-Einstein Condensates (BEC). Several highlights of the rich and sometimes bizarre history of vortex dynamics will be presented. The lecture aims at popularizing mechanical science to a broad audience of interested students and staff, and engineers from outside.

Refreshments (gløgg mm.) will be served after the lecture.

**Alle er velkomne!**

Ole Sigmund og Martin P. Bendsøe

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