

Abstract Submitted  
for the DFD10 Meeting of  
The American Physical Society

**Effect of Noise and Flow Field Resolution on the Evaluation of Fluid Dynamic Forces on Bodies Using only the Velocity Field and its Derivatives**<sup>1</sup> MARIA CECILIA BREDA, PAUL S. KRUEGER, Southern Methodist University — Determining unsteady fluid dynamic forces on bodies using only measurements of the velocity field and its derivatives is essential in many investigations, including studies of freely swimming or flying animals. In this project, all terms in a control-volume force equation utilizing only the velocity field and its derivatives discussed by Noca et al. (J. Fluids Struct., 13, 551 - 578) will be analyzed with regard to the influence of flow field noise and resolution to determine which terms dominate the error in the computed force and which factor has the greatest effect on the error. Using analytical and computational flow fields for which the lift and drag forces are known, irregularities found in real experimental results including noise and reduced spatial/temporal resolution will be added to assess their effect on the computed forces. Results for several canonical flows will be presented.

<sup>1</sup>Support by the SMU Department of Mechanical Engineering is greatly appreciated.

Paul Krueger  
Southern Methodist University

Date submitted: 02 Aug 2010

Electronic form version 1.4