

MECHANICAL ENGINEERING COLLOQUIUM

SPRING 2010

SEMESTER: ME 794-001

Wednesday, February 03, 2010

1:00-2:30pm

224 MEC DEPT.

Professor Y. Renardy

Chair, Mathematics Dept. at Virginia Tech

Direct numerical simulation of two-fluid dynamics with applications to drop retraction to drop retraction after a strain jump and viscoelastic drop deformation in shear.

Abstract

We consider a drop of one liquid suspended in another liquid, which is sheared, as a model of a Couette device. Numerical simulations are conducted with an in-house volume-of-fluid (VOF) code, with either a continuous surface force (CSF) algorithm with piecewise linear interface reconstruction, or with a more accurate but computationally more intensive paraboloid representation of the interface (PROST). The methodology will be presented. The Oldroyd-B and Giesekus constitutive models are implemented. Comparison with recent experimental results of P. Moldenaers (KU-Leuven) will be discussed.

Short Bio.

I obtained my Bachelor of Science degree with first class honours at the Australian National University, in Applied Mathematics. I obtained my Phd under John Mahony at the University of Western Australia in applied mathematics, on trapping of edge waves around submerged islands on the continental shelf. I then spent a year at the Mathematics Research Center, University of Wisconsin-Madison, during 1980-1981, where I met and promptly married Michael Renardy. We went to the University of Minnesota for a year to work with Dan Joseph in the Dept of Aerospace Engineering and Mechanics, then returned to Wisconsin for 5 years, where I was the Program Coordinator for the Mathematics Research Center. In 1986, I joined the mathematics department at Virginia Tech, and got tenure in 1989. I am a fellow of the American Physical Society Division of Fluid Dynamics, and hold a chair in the mathematics department at Virginia Tech.

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