1014-76-980 **Terry Jo Leiterman*** (terryjo@amath.unc.edu), University of North Carolina, Department of Mathematics Phillips Hall, CB #3250, Chapel Hill, NC 27599, and **Richard M McLaughlin**, **Roberto Camassa**, **Leandra Vicci**, **Richard Superfine**, **Jing Hao** and **Jonathan Toledo**.
Spinning Rods: Experiments & Theory.

The uniform motion of a thin body in a viscous (Stokes) fluid is a classical moving boundary problem which has been well studied using slender body asymptotic methods. The drag law and associated fluid flow induced by this motion has been deduced using an array of fundamental singularities of the Stokes equations known as Stokeslets. However, for non-uniform motions, much less is known. In 1970, Batchelor extended the slender body theory to allow for linear, non-uniform far field flow boundary conditions using only Stokeslet singularities. By extending exact solutions of Wu and Chwang, we present an exact solution of the Stokes equations for spheroidal geometry embedded in a linear, namely rotational, flow field. We show and compare these solutions to micro-fluidic mixing experiments performed using a 3D magnetic force microscope developed by Rich Superfine and collaborators in physics at UNC and to a table top experiment with the same design. To understand the effect this flow has on molecular conformations, single DNA molecules have been placed in the flow and their extension has been observed. We anticipate these new solutions to play an important role in the study of transport in ciliated tissues. (Received September 26, 2005)