1048-76-329 **Roberto Camassa*** (camassa@amath.unc.edu), Phillips Hall CB3250, Department of Mathematics, University of North Carolina, Chapel hill, NC 27599, **Terry Jo Leiterman**, Department of Mathematics, St. Norbert College, 100 Grant Street, DePere, WI 54115, and **Richard M McLaughlin**, Phillips Hall CB3250, Department of Mathematics, Chapel hill, NC 27599. *Spinning rods, microfluidics, and propulsion by cilia in biological systems.*

An important component in understanding and modeling how human lungs function lies in the hydrodynamics of the mucus fluid layers that coat lung airways. In healthy subjects, the beating of cilia is thought to be the primary mechanism for moving mucus. With the aim of establishing a quantitative benchmark of how cilia motion propels the surrounding fluid, we study the idealized situation of a single rod spinning in a fluid obeying the Stokes approximation, the appropriate limit for a Newtonian fluid with typical dimensions and time scales of cilia dynamics. New approximate – for cylindrical rods pinned to a flat plane boundary, and exact – for ellipsoidal rods freely spinning around their center – solutions for the fluid motion will be presented and compared with the experimental data collected with spinning magnetic nano-rods in water. In order to assess the influence of Brownian perturbations in this micro-scale experiment, data from an experimental set-up scaled by dynamical similarity to macroscopic (table-top) dimensions will also be presented and compared to the theoretical predictions. (Received February 10, 2009)