Experimental and theoretical study of mixing and transport due to the motion of a slender body sweeping out a cone.[1] TERRY JO LEITERMAN, University of North Carolina at Chapel Hill, RICHARD M. MCLAUGHLIN, ROBERTO CAMASSA, UNC RTG FLUIDS GROUP TEAM — We have used singularity theory to construct an exact solution for the fluid motion induced by a spheriod spinning about its center sweeping out a double cone in a low Reynolds number flow. We have additionally used slender body theory to construct an asymptotic solution for a slender cylinder attached to a no-slip plane spinning about its base sweeping out an upright cone. These time-varying, three- dimensional hydrodynamic solutions have been used to benchmark micro-fluidic experiments which have immediate consequences to understanding transport and mixing in ciliated tissues. A similar macro-scale experiment that is absent of thermal flucutations has been designed which validates the theory.

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