1145-92-1034 **H. Reed Ogrosky*** (hrogrosky@vcu.edu), 1015 Floyd Ave., PO Box 842014, Richmond, VA 23284-2014, and **Roberto Camassa** and **Jeffrey Olander**. *A simplified model of air-driven film transport in human airways.*

Human airways are lined with a thin layer of mucus, a non-Newtonian fluid that traps harmful particles and transports them away from the lungs. This transport is typically driven by the beating of cilia; in the case that cilia do not function properly, other mechanisms such as coughing and breathing can play a more primary role in mucus clearance. In this talk, we study a mathematical model of a simplified version of this problem, namely the flow of a viscous fluid that lines the interior of a vertical tube with airflow in the center of the tube meant to mimic breathing or coughing. Physical experiments have shown that if such periodic airflow is biased, e.g. having relatively fast upwards flow for less than half the period and relatively slow downwards flow for the remainder of the period, it is possible for the airflow to transport the film upwards against gravity. A recently-derived single nonlinear partial differential equation model that describes the evolution of the film's free surface is presented, and linear stability analysis demonstrates improved agreement with experiments when compared with earlier versions of the model in the case of steady airflow. Model solutions found numerically will be shown to qualitatively match results of earlier film transport experiments. (Received September 18, 2018)