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Effect of Phase Lag on Fluid Flow and Particle Dispersion in a Single Human Alveolus[1] SUDHAKER CHHABRA, AJAY PRASAD, University of Delaware — The human lung can be divided into (1) the conducting airways, and (2) the acini. The acini are responsible for gas exchange and consist of alveoli and bronchioles. The acini are useful delivery sites for inhaled therapeutic aerosols. In normal lung function the alveolus expands and contracts in phase with the bronchiole airflow oscillation. Lung diseases such as emphysema compromise the elasticity of the lung. Consequently, the alveolus may not oscillate in-phase with the oscillating bronchiole airflow. We have previously studied flow and particle transport in an alveolus for in-phase flow. The current work focuses on measuring out-of-phase airflow patterns and particle transport in an *in-vitro* model of a single expanding/contracting human alveolus. The model consists of a transparent, elastic, oscillating alveolus (represented by a 5/6th hemisphere) attached to a rigid circular tube. Realistic tidal breathing conditions were achieved by matching Reynolds and Womersley numbers. Flow patterns were measured using PIV; these velocity maps were subsequently used to calculate particle transport and deposition on the alveolar wall.

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Ajay Prasad
University of Delaware

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