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Secondary flow measurements and passive tracer dispersion in multi-generational models of conducting airways of the lung[1] FRANK FRESCONI, AJAY PRASAD, University of Delaware — A detailed knowledge of the flow and dispersion within the human respiratory tract is desirable for numerous reasons. Both risk assessments of exposure to toxic particles in the environment and the design of medical delivery systems targeting both lung-specific conditions (asthma, cystic fibrosis, and chronic obstructive pulmonary disease (COPD)) and system-wide ailments (diabetes, cancer, hormone replacement) would profit from such an understanding. The present work features experimental efforts aimed at elucidating the fluid mechanics of the lung. Particle image velocimetry (PIV) and laser induced fluorescence (LIF) measurements of steady and oscillatory flows were undertaken in anatomically accurate models (single and multi-generational) of the conductive region of the lung. PIV results captured primary and secondary velocity fields. LIF allowed visualization of the time-dependent deformation of a passive tracer and also quantified convective dispersion through the usage of a transport profile.

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