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Unsteady Simulation of a Human Respiratory System with Micron-Particles SHAHAB TAHERIAN[1], CEERS/CSULB, HAMID RAHAI[2], MAE Dept./CEERS/California State University, Long Beach, TOM WADDINGTON[3], VA Hospital, Long Beach, California — Unsteady numerical simulations of air flow, mixed with micron particles, through a human lung conducting zone during inhalation/exhalation process have been performed. The process included importing images from a high resolution MRI into a CFD software, generation of the CFD model and then CFD simulation over a 4 seconds cycle. The inlet diameter was 16 mm and the flow rate was 7 liter/ min. The implicit-unsteady Reynolds Average Navier-Stokes equations with the Wilcox K-ω turbulence model were used for the simulation. The micron particles were solid round lead with 1000 Kg/m^3 density. Results indicate high correlation between regions of the secondary flows and particle deposits. This was mostly evident in the main bronchus. While most particles exit the lung during the exhalation process, however, areas of re-circulating flow and near the walls continue to have some particle deposits.

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