Abstract Submitted
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Assessment of regional effects in pulmonary aerosol delivery using Direct Numerical Simulation (DNS)[1] STAVROS KASSINOS, FOTOS STYLIANOU[2], PANTELIS KOULLAPIS, Univ of Cyprus, UCY-COMPSCI TEAM[3] — Recent computational studies have shown that the airflow in the upper human airways is turbulent during much of the respiratory cycle. One of the features of respiratory airflow that poses a challenge to computations based on Reynolds-Averaged Navier-Stokes (RANS) closures is the laminar-turbulent-laminar transition as the flow moves from the mouth through the glottis and down to the lower conducting airways. Turbulence and unsteadiness are expected at least through the first few bifurcations of the airways. In the case of inhaled medicines, and depending on the size of the particles in the formulation, airway bifurcations are areas of preferential deposition. Here, we use Direct Numerical Simulations (DNS) to examine aerosol deposition in the case of turbulent flow through a realistic representation of the tracheal bifurcation. We examine the flow characteristics in detail, including the turbulent structures and how they affect the deposition of particles of different sizes. DNS results are compared with RANS computations.

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