

Abstract Submitted
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Aerosol transport and deposition efficiency in the respiratory airways LAURA NICOLAOU, Imperial College London, TAMER ZAKI, Johns Hopkins University — Prediction of aerosol deposition in the respiratory system is important for improving the efficiency of inhaled drug delivery and for assessing the toxicity of airborne pollutants. Particle deposition in the airways is typically described as a function of the Stokes number based on a reference flow timescale. This choice leads to significant scatter in deposition data since the velocity and length scales experienced by the particles as they are advected through the flow deviate considerably from the reference values in many sections of the airways. Therefore, the use of an instantaneous Stokes number based on the local properties of the flow field is proposed instead. We define the effective Stokes number as the time-average of the instantaneous value. Our results demonstrate that this average, or effective, Stokes number can deviate significantly from the reference value particularly in the intermediate Stokes number range. In addition, the effective Stokes number shows a very clear correlation with deposition efficiency, and is therefore a more appropriate parameter to describe aerosol transport.

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