

Abstract Submitted
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On the Effects of Intra- and Inter-Subject Variabilities on Human Inspiratory Flow¹ JIWOONG CHOI, CHING-LONG LIN, Univ. of Iowa, MERRYN H. TAWHAI, Univ. of Auckland, ERIC A. HOFFMAN, Univ. of Iowa — The effects of intra- and inter-subject variabilities on airflow patterns in the human central airways are investigated using large-eddy simulation (LES). The anatomical airway models are reconstructed from multi-detector row computed tomography (MDCT) image data. The intra-subject study considers four models of the same human subject, including complete, partial, and no upper respiratory tract. Either pressure or velocity boundary conditions are specified at the mouth, mid pharynx, supraglottis, and tracheal entrance, respectively, with two different flow rates. The inter-subject study considers upper and intra-thoracic airways (up to 6 generations) of two human subjects. LES captures the turbulent laryngeal jet formed at the vocal cords. It is found that the use of a complete upper respiratory tract as well as the anatomically realistic airway geometry is essential to correctly reproduce the laryngeal jet behavior and turbulent coherent structures in particular.

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