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Airway flow generated in abnormal breathing patterns MANIKANTAM GADDAM, ARVIND SANTHANAKRISHNAN, Oklahoma State University — Normal breathing is a combination of involuntary expansion and contraction of chest and diaphragm muscle moments. Normal respiratory rate (RR) is in the range of 10-20 breaths per minute. Physiological and pathological causes can lead to abnormal breathing patterns such as: tachypnea (approximately 1.5x increase in RR), bradypnea (1.5x decrease in RR), hyperpnea (deep breathing with abnormally large peak flow rate), and hypopnea (shallow breathing with abnormally low peak flow rate). To investigate the airway flow fields representative of these abnormal breathing patterns, 3D simulations were performed on an idealized airway model up to the 2^{nd} bifurcation, using k-ω model available in ANSYS Fluent v19. A parametric study was conducted across varying: (a) peak flow rates (during inhalation and exhalation) and (b) cycle duration. At the end of one-minute, cumulative mass flow rates at outlets followed the order of tachypnea >hyperpnea >normal >hypopnea >bradypnea. Airway flows during varying breath hold durations will also be discussed.

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