

Pressure Losses on Realistic Geometry of Tracheobronchial Tree

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Abstract : Real bronchial tree is very complicated piping system. Analysis of flow and pressure losses in this system is very difficult. Due to the complex geometry and the very small size in the lower generations is examination by CFD possible only in the central part of bronchial tree. For specify the pressure losses of lower generations is necessary to provide a mathematical equation. Determination of mathematical formulas for calculating the pressure losses in the real lungs is due to its complexity and diversity lengthy and inefficient process. For these calculations is necessary the lungs to slightly simplify (same cross-section over the length of individual generation) or use one of the models of lungs. The simplification could cause deviations from real values. The article compares the values of pressure losses obtained from CFD simulation of air flow in the central part of the real bronchial tree with the values calculated in a slightly simplified real lungs by using a mathematical relationship derived from the Bernoulli equation and continuity equation. Then, evaluate the desirability of using this formula to determine the pressure loss across the bronchial tree.

Keywords : pressure gradient, airways resistance, real geometry of bronchial tree, breathing

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