Complexity DTC Miniproject 2010/2011

Multiscale simulation of patient specific models of the human lung

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OBJECTIVES

The aim of this project is to model the geometrical complexity of the human lung and its function. A coupled 3D/1D geometric model of the human respiratory system will be developed, and pulmonary airflow through the conducting airways will be simulated. This will be achieved through the creation of a geometric model of the airway combining three dimensional data produced by X-ray Computed Tomography radiography with a one dimensional fractal structure used to model bronchial airways from the limits of the data available from radiographic methods to the level of the terminal bronchioles.

More details can be found here http://www2.warwick.ac.uk/fac/sci/eng/staff/ymc/research/lungs/

METHODOLOGIES

This research project consists of (up to) three components required to produce an accurate and effective model of the flow in the respiratory system:

- Geometric modelling of one dimensional fractal structure
- Composite mesh generation produced from three dimensional CT data
- Three dimensional and one dimensional CFD analysis