



سمینار هفتگی گروه ماده چگال نرم

Whole lung modeling with porous media approach

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Lung is the vital respiratory organ of all air-breathing vertebrates. Air is routed from the nasal cavity and trachea to the lung. Following a series of dichotomous branching airways, air reaches to the alveolar gas exchange regions. There are more than 300 million alveoli deep in the lung where air and blood are brought to close contact and gas exchange takes place. Particles suspending in the air are also admitted to the lung. They are many diseases related to the malfunction of the airway system or the alveolus region and particle-lung interaction. There are also many models to understand the lung behavior and its interaction with particles. Current models are classified as regional models in which just a small number of airway bifurcations are modeled or whole lung models. Because of the large number of the conducting airways and alveoli available, whole lung models usually lose the flow details. Lung is also a deforming organ. The flow is unsteady and reversing in the lung. These features are usually neglected in the current models. In the porous media model of the lung we try to model the whole lung considering both deformation and flow unsteadiness. In this talk the anatomy and physiology of the lung is considered shortly. Recent models and their pros and cons are addressed. Then the porous media approach to the lung modeling is discussed. Finally, Rayan, a CFD tool based on the porous media lung modeling requirements, is introduced.

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