

Continuum-Based Modelling Approaches for Cell Mechanics

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Abstract : The quantitative study of cell mechanics is of paramount interest since it regulates the behavior of the living cells in response to the myriad of extracellular and intracellular mechanical stimuli. The novel experimental techniques together with robust computational approaches have given rise to new theories and models, which describe cell mechanics as a combination of biomechanical and biochemical processes. This review paper encapsulates the existing continuum-based computational approaches that have been developed for interpreting the mechanical responses of living cells under different loading and boundary conditions. The salient features and drawbacks of each model are discussed from both structural and biological points of view. This discussion can contribute to the development of even more precise and realistic computational models of cell mechanics based on continuum approaches or on their combination with microstructural approaches, which in turn may provide a better understanding of mechanotransduction in living cells.

Keywords : cell mechanics, computational models, continuum approach, mechanical models

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