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Computational modeling of cell–cell interaction and multicell migration

Zeng, Xiaowei, xiaowei.zeng@utsa.edu, University of Texas, San Antonio, United States

ABSTRACT

Cell migration plays an essential role in many physiological processes including morphogenesis, wound healing, and tumor metastases. To accomplish certain physiological tasks, cell motion must occur in a defined direction. The failure of cells to migrate or migration to inappropriate locations can result in abnormities and diseases, such as tumor formation and metastasis. To explain such biological and biophysical phenomenon has been the focus of cell research as well as cell mechanics research. In this presentation, we shall present our latest results on modeling and simulation of cell-cell interaction and cell migration. The macroscale cell is modeled as soft materials and cell–cell interaction is modeled by an adhesion force. We have developed and implemented a Lagrange type Meshfree Galerkin formulation and related computational algorithms for the described cell migration model. In addition, we have simulated the multicell migration process on different extracellular matrix substrates.