

Magdalena A. Stolarska

UNIVERSITY OF ST. THOMAS, SAINT PAUL, MN, USA

e-mail: mastolarska@stthomas.edu

A mechanical model of cell motility and cell-substrate interaction

Mechanical interactions between a cell and the substrate are vital for cell migration and are involved in various cellular processes, such as wound healing, embryonic development, a metastasis of cancerous tumors. In addition, experiments have shown that inter-cellular and cell-substrate mechanical interactions affect signal transduction pathways within the cell. As a result, understanding the nature of force generation by single cells and mechanical interaction of a cell with the substrate is extremely important.

In the talk, I will present a mathematical model of cell motility and cell-substrate interaction where the cell and substrate are modeled as elastic two-dimensional continua. The spatially and temporally dynamics cell-substrate attachments are treated as discrete spring-dashpot systems. A finite element implementation of the model of cell and substrate deformation is coupled to the equations governing the dynamics of the adhesions. The resulting simulations are used to better understand the oscillatory nature of amoeboid cell motility.