

Title: Mathematical Modeling of Cellular Blebbing Dynamics

Wanda Strychalski

Case Western Reserve University

Abstract: Cell migration plays an essential role in many important biological processes such as wound healing, cancer metastasis, embryonic development, and the immune response. Recent advances in microscopy have led to an increasing number of qualitative observations of cell migration in 3D environments that closely mimic physiological conditions. In particular, they showed that some cells such as leukocytes, embryonic cells, and cancer cells, migrating through 3D matrices adopt an amoeboid phenotype characterized by round, liquid-filled, pressure-driven protrusions. Blebs are one type of protrusion these cells use to migrate in different environments. A dynamic computational model of the cell is presented to simulate recent experiments of blebbing cells. Model results show that complex rheology of cytoplasm is essential to explain experimental observations.