From Crawlers to Swimmers- Mathematical and Computational Problems in Cell Motility

Hans G. Othmer

School of Mathematics
Digital Technology Center
University of Minnesota
Minneapolis, MN

Abstract

Cell locomotion is essential for early development, angiogenesis, tissue regeneration, the immune response, and wound healing in multicellular organisms, and plays a very deleterious role in cancer metastasis in humans. Locomotion involves the detection and transduction of extracellular chemical and mechanical signals, integration of the signals into an intracellular signal, and the spatio-temporal control of the intracellular biochemical and mechanical responses that lead to force generation, morphological changes and directed movement. We will discuss some of the mathematical and computational challenges that the integration of these processes poses and describe recent progress on some component processes.