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Phase field models of Dictyostelium discoideum migration YUNSONG ZHANG, Department of Physics Astronomy, Rice UniversityHouston, TX, YANXIANG ZHAO, Department of Mathematics, The George Washington University, Washington, D.C., BRIAN CAMLEY, WOUTER-JAN RAPPEL, Department of Physics, University of California, San Diego, La Jolla CA, HERBERT LEVINE, Department of Bioengineering, Center for Theoretical Biological Physics, Rice University, Houston, TX — The migration of eukaryotic cells is a result of the interplay between quite a few different factors, including cell mechanics and biochemistry. Such complexity has brought great challenges in the modeling of individual moving cells. Coupling biochemistry, cellular mechanics together with changing cell morphology, phase field models have been successful in explaining some behaviors of moving cells, such as periodic movements, rotations and turning. Here, we extend our current phase field to the situations with membrane-bound biochemical processes, to provide a framework for studying Dictyostelium discoideum, which exhibit extremely irregular morphology in migration. The phase field model will not only implement the tracking of cell shape, but also enable the studies of traction force patterns the cell may exert on the substrate.

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