A simple model of Keratocyte interface dynamics

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The cell interface dynamics is studied analytically in the framework of the nonlocal phase field model suggested in [1]. That model includes an equation for the order parameter coupled with an equation for the two-dimensional vector field, which describes the actine network polarization. A close evolutionary integro-differential equation governing the interface shape is derived. That equation provides the dependence of the normal velocity of the membrane on the interface curvature and some other relevant parameters. In a certain limit, the governing equation is reduced to a Burgers-like equation. The criteria for the existence of a stationary shape is obtained.

[1] F. Ziebert, S. Swaminathan, and I. S. Aranson, J. R. Soc. Interface 9, 10841092 (2012).