1121-35-46 **Leonid Berlyand*** (lvb2@psu.edu), Mathematical Department, Penn State, University Park, PA 16802, **Mykhailo Potomkin** (mup20@ucs.psu.edu), Mathematical Department, Penn State, University Park, PA 16802, and **Volodymyr Rybalko** (vrybalko@ilt.kharkov.ua), Nauky ave. 47, Kharkiv, Ukraine. *Sharp interface limit and traveling waves in a phase field model of cell motility.*

We study a system of two PDEs arising in modeling of motility of eukaryotic cells on substrates. This system consists of the Allen-Cahn equation for the scalar phase field function coupled with a vectorial parabolic equation for the orientation of the actin filament network. The two key properties of this system are (i) presence of gradients in the coupling terms and (ii) mass (volume) preservation constraints. We pass to the sharp interface limit to derive the equation of the motion of the cell boundary, which is mean curvature motion modified by a novel nonlinear term. We establish the existence of two distinct regimes of the physical parameters. In the supercritical regime we established surprising features of the motion of the interface such as discontinuities of velocities, and hysteresis in the 1D model, and instability of the circular shape and rise of asymmetry in the 2D model. We also proved existence of traveling waves. Because of properties (i)-(ii), classical comparison principle techniques do not apply to this system. Furthermore, the system can not be written in a form of gradient flow, which is why Gamma-convergence techniques also can not be used. This is joint work with V. Rybalko and M. Potomkin. (Received July 05, 2016)