

# Cell motility driven by the actin flow

M. Ben Amar\*, O. V. Manyuhina\* , and G. Napoli†

\* Laboratoire de Physique Statistique, Ecole Normale Supérieure, UPMC Univ Paris 06,  
Université Paris Diderot, CNRS, 24 rue Lhomond, 75005 Paris, France  
e-mail: oksana@lps.ens.fr, web page: <http://www.phys.ens.fr/~benamar>

† Dipartimento di Ingegneria dell'Innovazione Università del Salento, Via per Monteroni – Edificio  
“Corpo O”, I-73100 Lecce, Italy  
e-mail: [gaetano.napoli@unisalento.it](mailto:gaetano.napoli@unisalento.it)

## ABSTRACT

The symmetry breaking of the actin network from radial to longitudinal symmetry has been identified as the major mechanism for keratocytes (fish cells) motility on solid substrate. For strong friction coefficient, the two dimensional actin flow which includes the polymerisation at the edge and depolymerisation in the bulk can be modelled as a Darcy flow, the cell shape and dynamics being then modelled by standard complex analysis methods. We use the theory of active gels to describe the orientational order of the filaments which varies from the border to the bulk. We show analytically that the reorganisation of the cortex is enough to explain the motility of the cell and find the velocity as a function of the orientation order parameter in the bulk.

## REFERENCES

- [1] M. Ben Amar, O.V. Manyuhina and G. Napoli *Cell motility: A viscous fingering analysis of active gels*, Eur. Phys. J. Plus **126**, 19, 2011.