

# Cell motility generated by actin polymerization waves

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A cell's ability to move is one of its greatest merits. It enables the cell to efficiently search for nutrients and drives complex processes in tissues. Cell motility is often driven by the actin cytoskeleton. Although many important factors involved in actin-driven cell crawling have been identified and characterized in amazing detail, it is still poorly understood how the actin filament network is organized in this process. Spontaneous actin waves have been observed in a large number of different cell types. They present an attractive concept to understand actin-network organization during crawling. We introduce a mean-field description for actin assembly by nucleating promoting factors, negative feedback of actin filaments on the nucleators' activity, and active stress generation by molecular motors. The system can spontaneously generate traveling waves. We study confinement of this system to a cellular domain by means of a phase field and calculate the corresponding phase diagram. In particular, we find erratic motion due to the formation of spiral waves.