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Instabilities and boundary effects in a droplet of active polar liquid crystal CARL WHITFIELD, RHODA HAWKINS, University of Sheffield — Using the active gel theoretical framework, we have performed analytical calculations and numerical simulations of a droplet of active polar liquid crystal at low Reynolds number. This system is a simplified model of a cytoskeletal network that generates internal stresses by converting chemical energy (in the form of ATP) into mechanical work via molecular motors. A physical understanding of these systems can give an insight into the complex and varied dynamics of eukaryotic cell migration and division. We perform a linear stability analysis on the system by separating the behaviour into two limits. One where the internal polarisation is dominated by the shape of the boundary and one where it is deformed by the activity. We find that the two regimes show different instability thresholds for the activity parameter suggesting interesting behaviour both in and between these limits. We also simulate the system numerically and find the resulting steady state of the droplet for a range of parameters between these two limits.

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