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Density shocks in confined microswimmers ALAN CHENG HOU TSANG, EVA KANSO, University of Southern California, BIODYNAMICS TEAM — Motile microorganisms are often subject to different types of boundary confinement in their natural environment, but the effects of confinement on their dynamics are poorly understood. We consider an idealized model of confined microswimmers restricted to move in a two-dimensional Hele-Shaw cell. We then impose two different types of boundary confinement: circular and sidewalls confinement. We study how boundaries trigger the emergence of global modes. In the case of circular confinement, the microswimmers can spontaneously organize themselves into a single vortex state when the radius of the circular boundary is below a certain critical value, reminiscent to what have been observed in recent experiments of bacterial suspensions. In the case of sidewalls confinement in a rectangular channel, the microswimmers form density shock, via interaction with the sidewalls and background flow. We show that, through controlling the strength of background flow, we can manipulate the density shock to form at the back or front of the swimmer clusters or the suppression of the shock which gives rise to a uniform traveling wave of swimmers.

Alan Cheng Hou Tsang
University of Southern California

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