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**Synchronised states of hydrodynamically coupled filaments and their stability**[1] SMITHA MARETVADAKETHOPE, YONGYUN HWANG, ERIC KEAVENY, Imperial College London — Cilia and flagella are organelles central to fluid transport around tissues, unicellular locomotion, and in early mammalian development. They are observed to undulate, rotate, and beat symmetrically in pairs or even in large numbers via metachronal waves. Inspired by biflagellate swimmers like Chlamydomonas, we analyse regions of bistable synchrony exhibited in Stokes flow by a filament pair tethered to a rigid planar surface. In this study, we use a base-driven, geometric switch model to generate filament motion and establish the existence of two stable and two unstable branches of synchrony. An unstable anti-phase branch is characterised using Floquet analysis, while an edge state between two basins of attraction is found via a bisection algorithm to track the edge behaviour over time. We fully characterise a bifurcation diagram, the nature of the bifurcation points, and further find that the observed dynamical system can be captured by the development of a modified Adler equation.

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