Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Inertia changes the stability of synchronized states in hydrodynamically coupled oscillators SHANSHAN JIANG, LISA FAUCI, Tulane University — We examine the hydrodynamic interaction of two oscillators in a 2D fluid driven by a geometric switch. Motivated by the work of Kotar et al (PNAS, 107:17, 2010), the colloidal oscillators are modeled by circular membranes that support tensile forces on their boundary and forces due to an external trap that switches between two spatial positions, depending upon the position of the oscillator. Numerical experiments are performed using an immersed boundary framework where the viscous, incompressible fluid is governed by either the inertia-free Stokes equations or the full Navier-Stokes equations. In the Stokes case, the anti-phase state is stable and the in-phase state is not. However, when a slight amount of inertia is added, we find that both states are stable to small perturbations. For higher, but still moderate Reynolds numbers we find that the anti-phase state is unstable and all perturbations tend to in-phase oscillations – a dramatic change from zero Reynolds number

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Date submitted: 01 Aug 2015 Electronic form version 1.4