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Propulsion of a two-sphere swimmer DAPHNE KLOTSA, Department of Applied and Physical Sciences, University of North Carolina at Chapel Hill, KYLE BALDWIN, RICHARD HILL, ROGER BOWLEY, MICHAEL SWIFT, School of Physics and Astronomy, University of Nottingham, UK — We describe experiments and simulations demonstrating the propulsion of a neutrally-buoyant macroscopic swimming robot that consists of a pair of spheres attached by a spring, immersed in a vibrating fluid. The vibration of the fluid induces relative motion of the spheres which, for sufficiently large amplitudes, can lead to motion of the center of mass of the two spheres. We find that the swimming speed obtained from both experiment and simulation agree and collapse onto a single curve if plotted as a function of the streaming Reynolds number, suggesting that the propulsion is related to streaming flows. There appears to be a critical onset value of the streaming Reynolds number for swimming to occur. We observe a change in the streaming flows as the Reynolds number increases, from that generated by two independent oscillating spheres to a collective flow pattern around the swimmer as a whole. The mechanism for swimming is traced to a strengthening of a jet of fluid in the wake of the swimmer.

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