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Two-dimensional wakes of oscillating and tandem cylinders at low Reynolds number WENCHAO YANG, MARK STREMLER, Virginia Polytechnic Institute and State University — Transverse flow past an oscillating bluff body or multiple stationary bodies can produce wakes with complicated spatio-temporal structure. Previous work by others has characterized the wake structure as a function of system parameters. These are typically 2D characterizations, despite the fact that instabilities often cause such wakes to become strongly 3D. We use a flowing soap film system to investigate the connections and differences between (quasi) 2D wakes and 3D wakes generated behind oscillating and tandem cylinders. Wake structure is identified through flow visualization. Inspired by the work of Williamson and collaborators, we investigate the wake structure behind a circular cylinder forced to oscillate transverse to the flow. We map the boundaries of the different wake modes with variations in the amplitude and frequency of oscillation, and we discuss how our quasi-2D results compare with 3D results from the literature. We also consider the wake interaction of two stationary cylinders arranged in tandem. Existing literature disagrees on the critical cylinder spacing that gives changes in the wake mode. We examine this point and discuss the connections and distinctions between our quasi-2D experiments, 2D simulations, and results from the literature.

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