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Vortex shedding response of streamwise driven cylinders DANIEL TUDBALL SMITH, JUSTIN LEONTINI, JOHN SHERIDAN, Monash University, Australia, DAVID LO JACONO, INPT, UPS, CNRS, IMFT, Toulouse, France — Bluff body cylinders exhibit a range of responses when externally forced. This study experimentally investigated the modes of response and trends in shedding frequency of square and circular cylinders undergoing inline forced oscillations in a steady flow. Experiments were conducted in a free surface water channel over a range of Reynolds numbers from 1500 to 6300. With the driving frequency held constant at the natural unperturbed shedding frequency, the forcing amplitude was varied and the response examined. Frequency analysis of velocity, lift and drag forces showed that for low amplitude oscillation the shedding frequency decreases as amplitude increases, displaying a quadratic relationship. As amplitude increases further a region of possible mode competition exists until a critical amplitude is reached where the shedding locks to a period-doubled subharmonic of the forcing frequency. The region of mode competition is brief with an abrupt lock for the circular cylinder, while the square cylinder exhibits a gradual transition to the subharmonic over a larger range of amplitudes.

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