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Wake mode variability for a circular cylinder in a free stream with force sinusoidal in-line and cross-flow motion ERDEM AKTOSUN, JASON DAHL, University of Rhode Island — Quantitative flow visualization and force measurements were systematically obtained for a circular cylinder undergoing forced sinusoidal in-line and cross-flow motion in a free stream. Variation of the in-line amplitude, cross-flow amplitude, reduced velocity, and phase between in-line and cross-flow motions were made for a fixed Reynolds number of 7620, with a total of 819 experiments for flow visualization and 9555 for force measurements. Visual categorization of the wake shows a wide variability in pattern of vortices shed in the wake, resulting in a wide variability in the resultant forces acting on the cylinder. Although all motions are symmetric in the cross-flow direction, some parameter combinations are observed to produce an asymmetric wake and strong mean lift forces. For a simple demonstration of the complex variation of the wake, one example baseline motion is shown, where small perturbations from the baseline motion are given to demonstrate wake changes as a function of the motion parameters.

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