Abstract Submitted
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Spatiotemporal spectral analysis of a forced cylinder wake[1] JUAN D'ADAMO, Facultad de Ingeniería, Universidad de Buenos Aires (CONICET), RAMIRO GODOY-DIANA, JOSÉ EDUARDO WESFREID, PMMH UMR7636 CNRS, ESPCI ParisTech, UPMC (Paris 6), U. Paris Diderot (Paris 7) — The wake of a circular cylinder performing rotary oscillations is studied using hydrodynamic tunnel experiments at $Re = 100$. Two-dimensional particle image velocimetry on the mid-plane perpendicular to the axis of cylinder is used to characterize the spatial development of the flow and its stability properties. The lock-in phenomenon that determines the boundaries between regions of the forcing parameter space were the wake is globally unstable or convectively unstable is scrutinized using this experimental data. A novel method based on the analysis of power density spectra of the flow allows us to give a detailed description of the forced wake, shedding light on the energy distribution in the different frequency components and in particular on a cascade-like mechanism evidenced for a high amplitude of the forcing oscillation. In addition, a calculation of the drag from the velocity field is performed, allowing us to relate the resulting force on the body to the wake properties. Reference: Phys. Rev. E 84, 056308 (2011).

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Ramiro Godoy-Diana
PMMH UMR7636 CNRS, ESPCI ParisTech,
UPMC (Paris 6), U. Paris Diderot (Paris 7)

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