

Abstract Submitted
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Sensitivity of two-dimensional flow past transversely oscillating cylinder to streamwise cylinder oscillations GEORGE TRIANTAFYLLOU, Department of Naval Architecture and Marine Engineering, National Technical University of Athens, Athens Greece, SOFIA PEPPA, Department of Naval Architecture, Technological Educational Institute of Athens, Athens, Greece — The sensitivity of flow past transversely oscillating cylinder to streamwise harmonic perturbations is studied. The value of the Reynolds number is equal to 150. We start with a transversely oscillating cylinder and then impose a small streamwise (in-line) perturbation with a frequency equal to twice the transverse oscillation frequency. The cylinder is thus following an eight-shaped trajectory, which can be traversed in a counter-clockwise or clockwise direction. For the counter-clockwise mode of motion, we find that, for low to moderate values of the streamwise amplitude, the power transfer from the fluid to the structure increases with the amplitude of oscillation in the streamwise direction, even though the magnitude of the fluctuations of the forces is decreased. The increase of the power transfer becomes more important at higher values of the transverse amplitude of oscillation. For the clockwise mode of motion we observe the reverse trend, the hydrodynamic forces increase with the amplitude of oscillation and the power transfer decreases. It is shown that the variation of the power transfer in both types of motion is due entirely to the variation of the phase between the transverse oscillation of the cylinder and the vortex formation process.

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