

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Structures in the wake of a long flexible cylinder undergoing vortex-induced vibrations FRANCISCO HUERA-HUARTE, Graduate Aeronautical Laboratories, California Institute of Technology, Pasadena, CA 91125, USA, ANTON VERNET, Department of Mechanical Engineering, Universitat Rovira i Virgili, 43007 Tarragona, Spain — An investigation of the vortex structures in the wake of a long flexible cylinder responding at low mode numbers is presented. The experiments consisted of a cylinder model instrumented with strain gauges, with an external diameter of 16 mm and a total length of 1.5 m giving an aspect ratio of about 94. Reduced velocities based on the fundamental natural frequency up to 16 were reached, with Reynolds numbers up to 12000. The mass ratio was 1.8 (mass divided by mass of displaced fluid) and the combined mass-damping parameter was about 0.05. A detailed investigation of the strain signals, focused on cross-flow and in-line amplitudes, x-y trajectories and phase synchronisation, dominant frequencies, modal amplitudes and drag coefficients, has already shown the dynamic response of the model. Particle Image Velocimetry interrogations were done at two different positions along the length of the model, in order to observe the spanwise variation of the vortex structures and here, a fuzzy clustering technique has been used to identify them.

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Date submitted: 01 Aug 2008

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