Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

**Vortex-induced vibrations of a long flexible cylinder in transitional and turbulent flows** REMI BOURGUET, MIT, GEORGE KARNIADAKIS, Brown University, MICHAEL TRIANTAFYLLOU, MIT — The flow past a flexible cylinder subject to Vortex-Induced Vibrations (VIV) is investigated by direct numerical simulation at low and moderate Reynolds numbers (Re$= 100 - 1000$). The cylinder of large spanwise extension ($\geq 200$ diameters) is pinned and hinged at both ends and its central part is free to move in all directions under the effect of fluid-structure interaction. The cylinder dynamic is governed by a beam-cable equation. The influence of Reynolds number and structural parameters such as tension, bending stiffness and mass ratio, on VIV amplitudes and characteristic frequencies is quantified. The relationship between hydrodynamic efforts, structure motion and vortex shedding pattern is examined during the transition to turbulence. In particular, modifications of the alternating shedding pattern related with specific VIV conditions are analyzed in respect to the appearance of space/time irregularities in the structure response.

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Date submitted: 03 Aug 2009 Electronic form version 1.4