Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

**Floquet stability analysis of the wake of a circular cylinder undergoing VIV** RAFAEL S. GIORIA, JULIO R. MENEGHINI, NDF, Dept. Mech. Eng., Escola Politécnica, University of São Paulo — In some flow situations, bluff bodies undergo vortex-induced vibration (VIV). The amplitude of oscillation of a circular cylinder undergoing vortex-induced vibration has a three branch response in respect to the reduced velocity ($V_R = U_\infty/df$, where $U_\infty$ is the free stream velocity, $d$ the cylinder diameter and $f$ the natural frequency of the oscillation of the cylinder). One remarkable feature of the behavior is the jump in the amplitude between the upper and the lower branch: hysteresis is observed on this jump. This hysteretic phenomena is still subject of investigation. In this work, we investigate the circular cylinder three-dimensional wake behavior on the three different branches of response with the intention of acquiring better understanding of the hysteretic jump on the amplitude response of VIV. In order to realize this investigation, Floquet stability analysis of the two-dimensional wake of a circular cylinder in VIV is conducted. We choose two Reynolds numbers (Re) close to the secondary transition observed on the wake of a circular cylinder undergoing imposed oscillations: 280 and 300. The stability analysis is realized for each of the three branches of VIV response. We expect to observed subcritical unstable modes in the hysteretic region as these modes also present hysteresis on the transition.

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Date submitted: 08 Aug 2009 Electronic form version 1.4