Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Global modes in forced wakes BENJAMIN THIRIA, PMMH (espci-cnrs), JOSE EDUARDO WESFREID, CNRS — We are studying the Bénard-Von Karman instability near the threshold under forcing conditions in the wake of a cylinder performing rotary oscillations around its axis.of the lock-on region, the vortices are shed at the forcing frequency in the near wake and persist on a characteristic length which depends on the forcing conditions. Downstream of this region, the system always selects a different frequency in the far wake, which is close to the natural one.complete study of the linear stability in the case of forced wakes has shown a modification in the nature (magnitude and length) of the absolute instability region typical of synchronised open flows. For frequencies bigger than the unforced one, this absolute-convective instability transition is pushed back as a function of the forcing amplitude downstream of the cylinder. present experiments in order to study the shape of this new global mode. We will show that these different global modes, due to the effect of the forcing, present scaling laws as a function of the intensity and the frequency of the forcing. These scaling laws are presented as a function of the effective growth rate modified by the mean flow perturbation induced by the forcing.is the first time that a full explanation for the behaviour of forced flows is provided and which includes the understanding of the limits of the lock-on regions.

Jose Eduardo Wesfreid
CNRS

Date submitted: 08 Dec 2004 Electronic form version 1.4