Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Physical reduced model for the flow past a circular cylinder for $47 < Re < 100$[1] IAGO C. BARBEIRO, IVAN KORKISCHKO, JULIO R. MENEGHINI, J.A.P. ARANHA, NDF, Escola Politécnica, University of São Paulo, Brazil — The *Reynolds* ($Re = \frac{U.D}{\nu}$) range considered for this study lies within the time-periodic bidimensional régime where any experiment started by its stationary solution should evolve to a stable limit-cycle. This transient oscilatiory ramp starts with the exponential growth of the linear unstable eigenmode and finishes bounded by nonlinear effects with multi-harmonics extra dissipation. The steady solution and the leading eigenmode are numerically obtained using FEM discretization (*Taylor-Hood P2/P1 elements*) and *Arnoldi* iterations, then the nonlinear evolution operator is employed to generate new modes complementing the linear eigenmode up to a given order. The full NSE is then projected onto this physical base (*nonlinear Galerkin projection*) leading to a physical reduced system. This reduced model has a simple framework to track many nonlinear features like meanflow evolution and energy changes between the harmonics, clarifying the nonlinear mechanisms that takes this system to a periodic orbit. Numerical and experimental (*Particle Image Velocimetry*) evidences will be presented at the time of the meeting.

[1]Authors have grants from FINEP-CTPetro, FAPESP and Petrobras.

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Date submitted: 14 Oct 2009 Electronic form version 1.4