Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Numerical simulation of the velocity field and vorticity in a flow occurring in a channel and an open domain with periodic forcing[1] ERICK LOPEZ-SANCHEZ, GERARDO RUIZ-CHAVARRIA, Facultad de Ciencias Universidad Nacional Autonoma de Mexico — The system under study is a flow with periodic forcing in a channel that flows out toward an open domain. At the channel exit a pair of vortices is formed for each period. Using a pseudo-spectral method based on Chebyshev polynomials, the Navier-Stokes and continuity equations are solved numerically in the stream function-vorticity formulation (2D). The equations are integrated during several periods and for different values of Reynolds and Strouhal numbers. We found that the dipoles persist for more than one period and that their evolution depends strongly on the Strouhal number as predicted in previous works (e. g. Dynamics of Atmospheres and Oceans, 37 (2003) 223-244) but a rich dynamics emerges when interaction among vortices is taken account. For instance coalescence of vortices of the same sign can be observed. Besides this case, other two possibilities can be envisaged, namely, the dipoles travel a long distance if compared with the channel width and escapes or the dipoles fails to form completely and return to the channel when period is so short. Otherwise, numerical simulation shows the appearance of a sinusoidal instability which is a mechanism for the destruction of the vortices. Comparison with experimental and observational data is performed giving a good agreement.

[1]Authors acknowledge support by DGAPA-UNAM under project IN116312 "Vorticidad y ondas no lineales en fluidos."

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Date submitted: 02 Aug 2012 Electronic form version 1.4