Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Wake transition and vortex street interaction in flows generated by traveling localized Lorentz forces in a shallow electrolyte layer[1] JOEL ROMAN, SERGIO CUEVAS, Universidad Nacional Autonoma de Mexico — We present an experimental and numerical study of the vortex street produced by a traveling localized Lorentz force, namely a magnetic obstacle, in a thin layer of electrolyte. The Lorentz force is generated by the interaction a localized magnetic field created by a small permanent magnet which travels with a uniform velocity underneath a rectangular container and a uniform D.C. current applied transversally to the motion of the magnet. We find that by increasing the Reynolds number (based on the velocity of the magnet) the wake generated by the magnetic obstacle presents a transition from the Bénard-von Kármán (BvK) wake to the reversed BvK wake. In addition, we analyze the flow past a pair magnetic obstacles side-by-side in a thin layer of electrolyte by varying the separation between the magnets and the intensity of the applied current. The attention is focused in the interference of the wakes created by the magnetic obstacles. Numerical simulations based on a quasi-two dimensional numerical model present a satisfactory agreement with experimental results.

[1]Work supported by CONACYT, Mexico under Project 131399. J. Roman acknowledges a grant from CONACYT.

Joel Roman
Universidad Nacional Autonoma de Mexico

Date submitted: 01 Aug 2014 Electronic form version 1.4