

Abstract Submitted
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Lagrangian trajectories in Lissajous vortices¹ SERGIO CUEVAS, ALDO FIGUEROA, EDUARDO RAMOS, Centro de Investigacion en Energia, Universidad Nacional Autonoma de Mexico — We report Particle Image Velocimetry experiments in a rectangular container with a shallow layer of an electrolyte in which a vortex flow is driven by Lorentz forces produced by the field of a permanent cylindrical magnet and two alternate electric currents perpendicular to each other. Currents are injected through two pairs of parallel electrodes located at the container walls but avoiding short circuit. Due to the harmonic forcing in perpendicular directions, the system is excited analogously to the kinematic Lissajous figures although in the fluid case convective and viscous effects are present. In the creeping flow limit, an analytical solution is obtained so that the Lagrangian trajectories can be integrated. A full numerical solution that accounts for cases where non-linear effects are important is also used in the analysis. Lagrangian trajectories based on analytical, numerical and experimental results are compared for different values of amplitudes, frequencies and relative phases of the electromagnetic forcing.

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