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Vortical structures in the shallow flow past a magnetic obstacle in an electrolytic layer ALBERTO BELTRAN, Universidad Nacional Autonoma de Mexico and University of California, Los Angeles, SERGIO CUEVAS, EDUARDO RAMOS, Universidad Nacional Autonoma de Mexico, SERGEY SMOLENTSEV, University of California, Los Angeles — It is known that the interaction of electric currents (induced or injected) and a localized magnetic field produces a Lorentz force that inhibits the motion of the fluid and acts as an obstacle for the flow (a magnetifc obstacle). In this work, the flow in a shallow electrolytic layer produced by a uniform injected current and a localized non-uniform magnetic field is simulated numerically using quasi-twodimensional and three-dimensional models, with a parallelized version of the numerical code. Different vortex patterns that have been observed experimentally in the wake of the magnetic obstacle are obtained, including steady vortex dipoles and vortex shedding flow. The three dimensional structure of the flow is explored and, particularly, the velocity profiles in the layer depth showing the appearance of inflection points that determine the stability properties of the flow, are analyzed.

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