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Stability of the flow past a magnetic obstacle[1] SERGIO CUEVAS, ALBERTO BELTRAN, EDUARDO RAMOS, Universidad Nacional Autonoma de Mexico, SERGEY SMOLENTSEV, University of California, Los Angeles — The concept of a magnetic obstacle in an electrically conducting fluid flow refers to the opposing Lorentz force induced by a localized magnetic field that is in relative motion with the surrounding fluid. The name stems from some similarities that occur between the flow past a rigid obstacle and that generated by a localized magnetic field. In this work, the stability of a flow past a magnetic obstacle is described in terms of the Hartmann and Reynolds numbers of the imposed flow (the Hartmann number squared estimates the ratio of magnetic to viscous forces). We find that for a given Hartmann number the flow is steady for small Reynolds numbers and becomes time-dependent, shedding vortices periodically as the Reynolds number grows. But in sharp contrast to the case of a rigid obstacle, for even larger Reynolds numbers, the flow may become steady again. The dependence of the Strouhal number on the governing parameters is also explored.

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