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On the dynamic behavior of the flow past a magnetic obstacle ALBERTO BELTRAN, ROBERTO DOMINGUEZ-LOZOYA, JOEL ROMAN, EDUARDO RAMOS, SERGIO CUEVAS, Universidad Nacional Autonoma de Mexico — We study numerically the duct flow of an electrically conducting incompressible viscous fluid (a liquid metal) past a a localized magnetic field, namely, a *magnetic obstacle*. We use a quasi-two-dimensional model based on a formulation that includes the induced magnetic field as electromagnetic variable (B-formulation) and analyze the stability of the flow in the parametric space of the Hartmann and Reynolds numbers. We find that even though for a given strength of the localized braking Lorentz force (characterized by the Hartmann number) the flow may become unstable and give rise to a time-periodic wake, when a critical Reynolds number is reached, a further increase in the Reynolds number may result in the flow becoming steady again. Evidently, this behavior is not observed in the flow past a solid obstacle. Experimental observations carried out in a liquid metal (GaInSn) duct flow suggest that this prediction is correct.

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