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Flow past a Magnetic Obstacle in a Cylindrical Pipe WAYNE N MANRAKHAN[1], Delaware State University — The effect of a magnetic obstacle, a uniform magnetic field, on an incompressible, conducting, viscous fluid has been fairly extensively studied. However most studies have modeled the fluid moving in a rectangular container. It would be interesting to see if similar physical effects such as the creation of vorticities in low Reynolds number flows occur in cylindrical containers. Thus a numerical study of the flow of a low Reynolds number, incompressible, conducting, viscous fluid in a cylindrical pipe with insulating walls around a single magnetic obstacle was performed. The magnetohydrodynamic (MHD) equations are solved using a highly conservative finite difference scheme on a non-uniform grid. The simulation show the creation of wakes, vorticities, and the shedding of vorticities though the dynamics of these vorticities are different from similar flows in rectangular ducts. These differences involving the motion and shedding of the vorticities will be highlighted.

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