STEADY AXISYMMETRIC VORTEX FLOWS WITH SWIRL AND SHEAR

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Abstract. A general procedure is presented for computing axisymmetric swirling vortices which are steady with respect to an inviscid flow that is either uniform at infinity or includes shear. We consider cases both with and without a spherical obstacle. Choices of numerical parameters are given which yield vortex rings with swirl, attached vortices with swirl analogous to spherical vortices found by Moffatt, tubes of vorticity extending to infinity and Beltrami flows. When there is a spherical obstacle we have found multiple solutions for each set of parameters. Flows are found by numerically solving the Bragg-Hawthorne equation using a non-Newton-based iterative procedure which is robust in its dependence on an initial guess.

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