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Vortex Dipoles with Prescribed Nonlinear Profiles ALAN ELCRAT, KEN MILLER, TRENTON ALBRECHT, Wichita State University — We obtain translating vortex pairs using a generalization of the method used in Elcrat,Fornberg,Horn and Miller JFM2000 409 for vortex patches in flow past a cylinder. When the profile function F in $\Delta\psi = \omega F(\psi - \alpha)$, ψ the stream function for the flow, is piecewise constant the flows obtained are the Translating V-States found in Wu,Overman and Zabusky JCP1984 53. When the vortex support attaches to the symmetry axis the flows are called dipoles, and when F is linear we retrieve the Lamb-Chaplygin pair. The solution procedure that we use in which ψ is obtained from an iteration $\Delta\psi_{n+1} = F(\psi_n)$ where the area of the vortex support is fixed in an inner iteration, allows general F. We have computed solutions for F that have 2 continuous derivatives at $\psi = 0$. These lead to "smooth" dipoles, and the solutions obtained have elliptical shapes of the sort obtained recently in Kizner and Khvoles Reg.Chaotic Dyn. 2004 9. The methods that we use extend naturally to translating dipoles in the β -plane approximation for flow over a rotating sphere.

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