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Dust Devil Dynamics W. HORTON, UT Austin, IFS, H. MIURA — A dust devil is a rotating updraft, with coherent structures ranging from small (H/D $\sim$ 5m/1m) to large (H/D $\sim$ 1000 m/10 m). Common in west Texas and Arizona, dust devils are formed unstable stratification of the air by solar heating over a sandy floor. Unstable gravity waves grow exponentially in the low density, hot air, rising into the upper layer of stably stratified atmosphere creating the large, 3D vortex. Dust devils are common on Mars. On Earth radio noise and electrical fields greater than 100kV/m are inferred [Kok J. F., N. O. Renno (2006), Geophys. Res. Lett., 33, L19S10]. Dust devils pick up small dirt and dust particles. The whirling charged dust particles (30 -50 microns) create a magnetic field that fluctuates between 3 and 30 times each second. The electric fields created assist the vortices in lifting materials off the ground and into the atmosphere. We use the theory and simulation tools of fusion plasma physics to describe dust devils. The Grad-Shafranov equation governs the vorticity dynamics and gives a solution for steady axisymmetric flows. The high core velocity is limited by the vortex model with viscous dissipation. The Reynolds number is not large, so these structures are well represented with super computers, in contrast to collisionless plasmas. Research supported by NIFS, Japan and the NSF through ATM-0638480 at UT Austin.

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