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Alexander Y Klimenko*, klimenko@mech.uq.edu.au. *Compensating mechanism in tornado-like flows and the associated power laws.*

This presentation gives a consistent treatment of axisymmetric flows with strong vorticity, such as in tornadoes, and discusses the associated asymptotic analysis. The analysis is used to introduce a compensating mechanism which, on one hand, generates tangential vorticity that is sufficient to stimulate and support the flow convergence but, on the other hand, prevents over-generation of the tangential vorticity, which would destabilize the flow. It is this mechanism that ultimately makes tornadoes and tornado-like vortices persistent and stable. The mechanism leads to the $4/3$ power law (more accurately in the $4/3$ - $3/2$ power range) in an intermediate asymptotic region between the viscous core and the outer scales. The tornado-like vortices are continuously affected by atmospheric disturbances and the power laws tend to fluctuate around $4/3$. Some examples of the power laws in tornadoes and hurricanes are presented. (Received August 22, 2016)