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Douglas P. Dokken, Mikhail M. Shvartsman and **Kurt Scholz**. *Alternative powers of decay
in swirling vortex solutions*. Preliminary report.

We consider a modification of the fluid flow model for a swirling vortex developed by J. Serrin, where velocity decreases as the reciprocal of the distance from the vortex axis. Recent studies, based on radar data of selected severe weather events, indicate that the angular momentum in a tornado may not be constant with the radius, and thus suggest a different scaling of the velocity/radial distance dependence. Motivated by this suggestion, we consider Serrin's approach with the assumption that the velocity decreases as the reciprocal of the distance from the vortex axis to the power b with a general $b > 0$. This leads to a boundary-value problem for a system of nonlinear ordinary differential equations. We analyze this problem for particular cases, both with nonzero and zero viscosity, discuss the question of existence of solutions, and use numerical techniques to describe those solutions that we cannot obtain analytically. (Received September 25, 2012)