Meeting: 1000, Albuquerque, New Mexico, SS 9A, Special Session on Mathematical Methods in Turbulence

1000-35-99 **Monika Nitsche*** (`nitsche@math.unm.edu`), Department of Mathematics and Statistics, Humanties 415, Albuquerque, NM 87131-1141, and **Darryl Holm** and **Vakhtang Putkaradze**.
Comparison of Euler-alpha and vortex blob regularization of vortex filaments and sheets.

The Euler-alpha and the vortex blob model are two regularizations of incompressible fluid motion. The alpha model was originally obtained by Lagrangian averaging of the Euler Equations in order to provide a turbulence model. The vortex blob model is obtained by replacing the singular Biot-Savart kernel by a convolution and was introduced to regularize vortex sheet motion. We show that both regularizations fit in the same framework and present the parallels between them. We apply both regularizations to compute planar and axisymmetric vortex filament and vortex sheet motion. By certain measures, the Euler-alpha kernel is closer to the unregularized kernel than the vortex blob kernel. The effect of this is observed in the vorticity field of a regularized point vortex and axisymmetric vortex filament, in the linear stability results for a vortex sheet, and in the core of vortex sheet spiral roll-up. Asymptotic expressions for the self-induced velocity of circular vortex filaments are also included. (Received August 19, 2004)

1