Meeting: 1006, Lubbock, Texas, SS 2A, Special Session on Differential Geometry and Its Applications

1006-53-113 **Thomas A. Ivey*** (iveyt@cofc.edu), Dept. of Mathematics, College of Charleston, 66 George St., Charleston, SC 29424. *The $1/\kappa$ flow and related geometric evolution equations for curves.*

The "$1/\kappa$ flow", defined by $\gamma_t = -(1/\kappa)T + (\kappa'/\kappa^3)N + (\tau/\kappa^2)B$, is a completely integrable flow for curves in R^3. Its bi-Hamiltonian structure was discovered independently by the speaker and by Mari-Beffa, Sanders and Wang. The main subject of this talk is the comparison of this flow with another, more widely known completely integrable flow for space curves, the vortex filament flow $\gamma_t = \kappa B$.

Each flow has "travelling wave" solutions which may be written down explicitly in cylindrical coordinates. The filament flow hierarchy has a Backlund transformation, while the $1/\kappa$ flow has a Backlund-like transformation which does not preserve independent variables. The Lax pair for the filament flow is essentially the Frenet equations for a natural frame along the curve, while a Lax pair for the $1/\kappa$ flow is not yet known.

Each flow is embedded in a hierarchy of commuting flows, half of which restrict to planar curves. Flows in the vortex filament hierarchy are linked by a first-order recursion operator discovered by Langer and Perline, while flows in the $1/\kappa$ hierarchy form a double sequence under the action of its recursion operator. (Received February 10, 2005)