

Meeting: 1002, Pittsburgh, Pennsylvania, SS 7A, Special Session on Knots and Macromolecules

1002-53-208 **Jason Cantarella*** (jason@math.uga.edu), Department of Mathematics, University of Georgia, Athens, GA 30602, and **Joseph Fu, Robert Kusner, John Sullivan** and **Nancy Wrinkle**.
What do we know about kinked tubes? On shortest curves of constrained curvature. Preliminary report.

An old problem in the constrained calculus of variations is as follows: what is the shortest curve with fixed endpoints and tangent vectors and curvature bounded above by some constant K ? In this talk we present an overview of some new results on this problem— in particular, we discuss an Euler-Lagrange equation which characterizes length-critical curves with curvature equal to the bound K . These structures will be illustrated with a number of interesting examples. The results are of interest in the *ropelength problem*: find the shortest tube with fixed circular cross-section which ties a given knot. (Received September 14, 2004)