1146-35-246 **Maria Deliyianni**, 1000 Hilltop Circle, Baltimore, MD 21250, and **Justin T Webster***, 1000 Hilltop Circle, Baltimore, MD 21250. *Large Deflections of an Inextensible Cantilevers In A Potential Flow.*

Motivated by the recent interest in piezoelectric energy harvesting, we study large deflections of an elastic cantilever driven by non-conservative flow terms. Typical models consider nonlinear forces due to local stretching (extensibility). We consider nonlinearity instead coming from a more appropriate inextensibility constraint. This leads to nonlinear inertia and stiffness, introducing nonlocality and spatial quasilinearity.

In the talk we use a Galerkin procedure with cantilever modes. Owing to the nonlinear terms, there is no natural weak formulation, and identifying weak limits requires additional compactness. For stiffness terms, we obtain estimates in higher topologies for smooth data. A generalized Gronwall yields estimates for small time (or data small in the finite energy sense). Inertial terms require the addition of strong damping or rotary inertia to provide meaning to each PDE term. Local existence of strong solutions is obtained.

Uniqueness follows from a novel decomposition of the dynamics, and superlinearity provides low frequency control, opening the door to long-time considerations. Time permitting, we show recent numerical results for flow-cantilever simulations, and present the 2-D system for a cantilevered rectangular plate. (Received January 23, 2019)