

LadHyX Seminar – April 18, 14:00

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### **Pinching and instability of a polymeric thread**

When a liquid containing a dilute solution of long, flexible polymers breaks up under the action of surface tension, it forms drops with long, nearly uniform threads in between: the beads-on-a-string structure. The shape of the thread near one of the beads is characterised by a similarity solution, which we calculate for an Oldroyd-B model. In particular, we calculate the thread thickness for the first time using the full axisymmetric equations of motion.

At a later stage, at a thickness in the order of microns, the thread becomes unstable to the formation of a non-uniform “blistering” pattern: tiny drops separated by threads of highly concentrated polymer solution. We show that standard models for the coupling between stress and polymer concentration lead to a linear instability, which exhibits very strong transient growth of the free surface perturbation. A high concentration of polymer remains in the thread part of the structure. Theory is tested against recent experiments using polymer solutions at different temperatures and concentrations.