

# PHYSICAL MATHEMATICS SEMINAR

## The Fluid Mechanics of Metals

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### ABSTRACT:

In this talk we will discuss the mathematical modelling of violent elastic-plastic deformation of metal samples when subject to stresses far in excess of the yield stress. In such regimes the metal can be treated as a barotropic incompressible fluid in which the strength, measured by the ratio of the yield stress to the applied stress, is negligible to lowest order. By exploiting the smallness of this ratio, we derive a one-dimensional elastic-plastic model which treats the effects of elasticity as a small perturbation to a leading order barotropic flow model. We will then use this model to investigate the elastic and plastic waves that can propagate through a metal sample under loading and in the process find a fascinating analogue to the famous “pantograph problem.”

**TUESDAY, SEPTEMBER 19, 2017**

**2:30 PM**

**Building 2, Room 142**

*Reception following in Building 2, Room 290  
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>