



قطب علمی  
سیستم‌های پیچیده  
و ماده چگال



سمینار هفتگی ماده چگال نرم

عنوان سمینار

## Discontinuous shear-thinning in adhesive dispersions

ارائه دهنده

**Ehsan Irani**

نام دانشگاه و دانشکده

Berlin Institute for Medical Systems Biology, Max Delbrück Center for Molecular  
Medicine in the Helmholtz Association, Berlin, Germany

چکیده

We present simulations for the steady-shear rheology of a model adhesive dispersion. We vary the range of the attractive forces  $u$  as well as the strength of the dissipation  $b$ . For large dissipative forces, the rheology is governed by the Weissenberg number  $Wi \sim b\dot{\gamma}/u$  and displays Herschel-Bulkley form  $\sigma = \sigma_y + cWi^\nu$  with exponent  $\nu = 0.45$ . Decreasing the strength of dissipation, the scaling with  $Wi$  breaks down and inertial effects show up. The stress decreases via the Johnson-Samwer law  $\Delta\sigma \sim T_s^{2/3}$ , where temperature  $T_s$  is exclusively due to shear-induced vibrations. During flow particles prefer to rotate around each other such that the dominant velocities are directed tangentially to the particle surfaces. This tangential channel of energy dissipation and its suppression leads to a discontinuity in the flow curve, and an associated discontinuous shear thinning transition. We set up an analogy with frictional systems, where the phenomenon of discontinuous shear thickening occurs. In both cases tangential forces, frictional or viscous, mediate a transition from one branch of the flowcurve with low tangential dissipation to one with large.

زمان: شنبه ۹۷/۰۶/۳۱ ساعت ۱۵:۳۰

مکان: تالار جناب دانشکده فیزیک