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Microrheological characterization of thin films and nanoliter droplets using Magnetic Rotational Spectroscopy with ferromagnetic nanorods. PAVEL APRELEV, KONSTANTIN KORNEV, Clemson University, KORNEV GROUP TEAM — Recent advances in the fields of soft and composite materials have led to the development of Magnetic Rotational Spectroscopy (MRS) - a technique for analysis of microrheological properties of complex fluids such as gels and polymer solutions. MRS requires minute amounts of liquids to be studied and thus allows for direct characterization of viscosity and elasticity of thin films. It relies on rotation of ferromagnetic nanorods uniformly dispersed in the studied solution with a steadily rotating magnetic field. The rotational behavior of the nanorod when the magnetic and viscous drag torques are nearly the same is very sensitive to the rod's magnetization, the liquid's rheology, and the external magnetic field. We have developed an experimental procedure to accurately control the external magnetic field and carefully study this behavior. We have applied MRS to study microrheology of biofluids as well as kinetics of curing of thin polymer films.

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