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Rheology of active polymer solutions M. CRISTINA MARCHETTI, Syracuse University, TANNIEMOLA B. LIVERPOOL, Leeds University, UK — In vitro solutions of biopolymers and associated motor proteins have been used to probe cytoskeletal dynamics under controlled conditions. Experiments have shown that motor-induced filament sliding competes with the slow Brownian polymer dynamics, driving the organization of the polymer network into complex patterns and altering its rheological and mechanical properties. Starting from a semi-microscopic model of the motor-mediated interaction among filaments, we have obtained continuum equations for the coarse-grained fields (filament and motor densities, polarization, alignment tensor) describing the response of the active solution to an externally imposed flow. After deriving an expression for the active contribution to the stress tensor, we have evaluated the linear viscoelastic response of a dilute solution to a shear stress. In the isotropic state motor activity strongly enhances the viscoelasticity of the system, especially near the transition to an orientationally ordered state. Activity also increases the high-frequency shear modulus of the solution. – MCM was support by the National Science Foundation, grants DMR-0305407 and DMR-0219292. TBL acknowledges the support of the Royal Society.

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