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Disentanglement behavior of DNA and wormlike micellar solutions as probed with particle-tracking velocimetry. POUYAN BOUKANY, SHI-QING WANG, University of Akron — We study an ideal entanglement network to test a number of emerging ideas about how topological entanglement reorganizes in presence of shear flow. Aqueous DNA solutions and wormlike micellar solutions can be highly entangled at very low concentrations and thus very soft yet sluggish. A particle tracking velocimetric method, which was developed recently in our lab [1], was applied to determine the velocity profile of these solutions in simple shear under several flow conditions including large step strain, large amplitude oscillatory shear, startup continuous shear and creep. It is shown [2] that all of the nonlinear viscoelastic flow behavior is associated with development of inhomogeneous shear when nucleation of chain disentanglement takes place in reaction to imposed shear deformation. [1] *Phys. Rev. Lett.* **96**, 016001 (2006); *ibid.* **96**, 196001; *ibid.* **97**, 187801. [2] Manuscripts to be submitted to *Macromolecules* and *Langmuir*.

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