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Probing the breakdown of chain entanglement in simple shear: The effect of molecular weight distribution POUYAN BOUKANY, SHI-QING WANG, Department of Polymer Science, University of Akron — Our latest particle-tracking velocimetric (PTV) observations indicate [1] that a shear rate gradient develops across the gap in cone-plate shear cell when a fairly polydisperse entangled polymer solution is subjected to a velocity-controlled shear. The co-existence of a continuous spectrum of shear rates in the different layers is inconsistent with any theoretical description of shear banding (where only two values of shear rate would coexist). Could the smooth shear rate gradient be an artifact of the cone-plate shear cell? The present study applies the PTV measurements for a linearly-displaced shear cell that is free of any stress gradient. By examining a highly monodisperse sample and comparing its behavior with that of the polydisperse sample, we aim to explore the origin of the shear rate gradient and find out whether shear banding occurs in the monodisperse sample instead of a gradient of shear rate. [1] Tapadia, P.; Wang, S. Q. *Phys. Rev. Lett.* , in press (2005).

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