

Abstract Submitted  
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**Dynamics of induced dipole ER fluid: a continuous energetic approach** JIANWEI ZHANG, WENFENG LI, JIAXI LI, Dept. of Physics, Tongji University, Shanghai, China — We studied dynamics of Electrorheological (ER) fluid by continuum induced dipole fluid method [1]. We found that the velocity profile of ER fluid increases in high shear-rate region and solid particles are separated from colloid in high electric field. These findings demonstrated the breakdown of Bingham fluid model under high shear-rate and high electric field. Our continuum approach describes ER fluid's behaviors under most conditions. We also found that the shift of maximum shear stress under different electric field follows the same trend as that of the maximum static stress. This indicates that the static and dynamic stresses are both dominated by the same energetic process. A connection between micro-particles' structures and macro-dynamic properties under varying conditions is established by our continuum method. Our studies probe the physics of induced dipole ER fluid.

[1] Jianwei Zhang, Xiuqing Gong, Chun Liu, Weijia Wen, and Ping Sheng, Physical Review Letters 101, 194503, 2008.

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