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**Aspect-ratio effects on the electrorheology of dilute carbon-nanotube suspensions** CHEN LIN, JERRY W. SHAN, Rutgers University — The electrorheology of a dilute, single-wall-carbon- nanotube(SWNT)/alpha-terpineol suspension under external electric fields was experimentally investigated. The apparent viscosity of the suspension at SWNT volume fraction $\phi = 1.5 \times 10^{-5}$ was found to more than double at moderate shear rates under a field of strength 160 V/mm. The electrorheological response is interpreted in terms of an electrostatic-polarization model, where the governing parameter is a modified Mason number giving the ratio of viscous to dipole-dipole forces. A scaling analysis suggests that the magnitude of the electrorheological response in the dilute SWNT suspension, which is much higher than conventional electrorheological fluids at comparable volume fractions, is due to the high aspect ratio of the nanotubes. Comparison is made to a suspension of glassy carbon spheres, in which a three- order-of-magnitude-higher volume fraction is required to achieve similar increases in the apparent viscosity under the same conditions.

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