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Rheology and Acoustics of Highly Concentrated Wormlike Micellar Fluids JOSEPH GLADDEN, JOEL MOBLEY, Dept. of Physics and Astronomy, University of Mississippi — Wormlike micellar fluids have long been studied as a model non-Newtonian fluid. The dynamic microstructure of the fluid gives rise to a rich diversity of hydrodynamic phenomenon. Generally, these fluids are studied in a low concentration regime (0-20 mM of surfactant). In this talk, we will discuss recent rheological and acoustic measurements of highly concentrated wormlike micellar fluids with concentrations of 50 - 400 mM cetyltrimethylammonium bromide (CTAB) and 30 - 240 mM (respectively) sodium salicylate (NaSAL) in the temperature range of 22 - 45 Celsius. In 200 mM CTAB fluids, the activation energy, derived from stress relaxation time measurements, exhibit a discontinuous shift from about 60 kT below 33 celsius to about 40 kT above. Speed of sound and acoustic attenuation measurements were obtained by a broadband Fourier spectroscopic method using ultrasonic waves between 2 and 8 MHz. Each of the concentrations measured exhibits an peak in the acoustic attenuation between 33 and 38 Celsius. The speed of sound increases monotonically over 22 - 40 Celsius, very similar to pure water in both magnitude and temperature dependence. Attenuation measurements as a function of acoustic power using high intensity focused ultrasound will also be discussed.

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