



FRONTIERS IN MICRORHEOLOGY



Title(1): Fluctuations and rheology in active bacterial suspensions

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Abstract (1): In this work, we use microrheology to measure 'in vivo' the fluctuations and response of an active suspension of the bacterium *E. coli*. In particular, we ask what the non-equilibrium contribution to the stress arising from bacterial swimming makes to the rheology of the passive fluid. Our measurements of one- and two-point tracer particle correlations, when combined with the measured response function of a driven, optically trapped tracer, demonstrate violation of the fluctuation-dissipation theorem and enable us to extract the power spectrum of the active stress fluctuations. In some cases, we find a $1/\sqrt{\omega}$ scaling of the power spectrum which we show can be derived from a two-fluid model considering the interplay of coupled stress, orientation, and concentration fluctuations of the bacteria.

[1] DTN Chen, AWC Lau, LA Hough, MF Islam, M Goulian, TC Lubensky, AG Yodh PRL 99, 148302 (2007)



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