

## High-frequency Linear Viscosity of Emulsions Composed of Two Viscoelastic Fluids

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The high-frequency linear response to an oscillatory flow is studied for an emulsion of viscoelastic droplets suspended in another viscoelastic fluid. Our analysis applies when the frequency of the imposed flow is much higher than the inverse capillary-relaxation time of the drops. However, the imposed frequency can be comparable to the inverse timescales associated with the response of the component fluids. In our approach, the complex, frequency-dependent effective viscosity of the emulsion is described using the Bergman spectral representation. It allows us to characterize the response of the system in the complex domain by a single real function, i.e. the spectral density. Moreover, the spectral representation enables construction of rapidly converging continued-fraction approximations. We find that the emulsion response is accurately described by several coefficients of the expansion. Numerical results for the spectrum and the continued-fraction coefficients are presented at different volume fractions for emulsions of randomly distributed drops.

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