Physics AT QUEENS COLLEGE

Colloquium Notice

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Paths to Macroscopic Constitutive Equations

Complex fluids, including polymer melts and solutions, liquid crystals, colloidal and non-colloidal suspensions, etc., are routinely used in consumer and industrial applications and are present in many natural systems. Experimental rheology gives insight into the behavior of such systems in elementary flows and may point to underlying physical phenomena, but the ability to carry out computations in the complex geometries that are normally of interest requires continuum descriptions that can be integrated into conservation equations. Such constitutive equations may arise from empirical considerations, from microstructural analysis, or from fundamental principles of continuum mechanics. The history of the development of constitutive equations for flexible polymeric systems over six decades involves all three approaches, and there has been a synthesis over time that enables meaningful process calculations, although much remains to be done. Other areas are less developed. Continuum theories for suspensions, in particular, remain at a relatively primitive stage that is reminiscent of the situation for polymers many decades in the past, but it is likely that progress will be more rapid because of the ability to integrate ideas from the polymer community and elsewhere. In this talk we will look first at the development of macroscopic constitutive equations for flexible polymers and then consider the state of development and outstanding issues for suspensions.

Monday
December 3, 2012
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326