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Dynamics of Microcapsules and Red Blood Cells in Oscillating Shear Flow[1] MENGYE ZHAO, PROSENJIT BAGCHI, Rutgers University — In a recent experimental work, Dupire et al [PRL, **104**, 168101 (2010)] reported a non-periodic behavior of the red blood cells suspended in a sinusoidally oscillating shear flow. The nonperiodic motion was characterized by intermittent cell swinging and tumbling. A theoretical model based upon the work of Keller and Skalak [JFM, **120**, 27 (1982)] for shape- preserving cells was shown to predict the nonperiodic motion that was highly sensitive to the initial conditions. In this talk, we present a three-dimensional numerical study of deformable capsules in sinusoidally oscillating shear flow in order to address if similar nonperiodic motion is observed when deformation is present. For initially oblate capsules, we observe two types of dynamics: a swinging motion in response to the altering flow direction that occurs at both high and low values of shear rate amplitudes, and a continuous/unidirectional tumbling motion that occurs at intermediate values. We obtain phase diagram that shows existence of two critical shear rates and two oscillation frequencies. Unlike Dupire et al, we do not find nonperiodic motion, but we find that the swinging/tumbling dynamics is sensitive to the initial condition.

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