Sphere interaction in bounded shear flow of Oldroyd-B fluids[1]
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Mathematics, Univ of Houston — It is well-known that, up to the initial sphere
displacement, binary encounters of spheres in bounded shear flow of a Newtonian
fluid can have either swapping or non-swapping trajectories under creeping flow
conditions (Zurita-gotor et al., J. Fluid Mech. 592 (2007) 447-469). The motion of
dilute sphere suspensions in bounded shear flow of Oldroyd-B fluids at zero Reynolds
number has been studied. The pass and return trajectories of the two ball mass
centers in a two wall driven shear flow are similar to those in a Newtonian fluid;
but they lose the symmetry due to the effect of elastic force arising from viscoelastic
fluids. A tumbling chain of two balls (a dipole) may occur, depending on the value of
the Weissenberg number and the initial vertical displacement of the ball mass center
to the middle plane between two walls. The two ball tumbling motion has also been
compared with that of an ellipsoid in bounded shear flow Oldroyd-B fluids.

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