

### **Animation for a single ring polymer in simple shear flow without excluded volume interactions**

The parameters for animations (the name of the file is RingPolymerWithoutEV) are  $N=60$  and  $Wi=170$ . The monomers are colored by red and green for illustration. Obviously, the animations for ring polymers without excluded volume (EV) present only tumbling (TB) motion. When a ring polymer makes a TB motion, the chain undergoes a series of stretching, collapsing, tumbling, and restretching events. Without EV interaction, individual ring polymers tend to form a two-strand line rather than an ellipse shape in the flow-gradient plane, and the tank-treading (TT) motion is nearly negligible.