

Abstract Submitted  
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**Pair-collision between heterogeneous capsules in simple shear:  
Effect of membrane stiffness and membrane constitutive laws<sup>1</sup>** RAJESH  
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sity — Deformability of red blood cells affects hydrodynamic properties of blood  
and thereby physiological functions in many cardiovascular diseases, e.g. in sickle  
cell anemia and malaria, the cell membrane becomes stiff affecting their circulation  
through microvessels. Here, we numerically simulate the hydrodynamic interac-  
tion between a pair of cell-like capsules in a free shear flow, using a front-tracking  
method. The membrane is modeled using various constitutive equations. By varying  
the stiffness of one capsule ( $C_2$ ) and keeping all other parameters constant, we find a  
significant effect on the deformation and trajectory of the other ( $C_1$ ). Increasing the  
stiffness of  $C_2$  surprisingly increases the peak deformation of  $C_1$  while decreasing the  
cross-stream shift in its trajectory. However, the relative trajectory between capsules  
remains the same. Effects of constitutive laws and difference in behaviors between  
capsules and drops are investigated explaining underlying physics.

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