

Abstract Submitted
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Effect of external shear flow on sperm motility¹ MANISH KUMAR, AREZOO ARDEKANI, Purdue University — The presence of background flow affects the sperm trajectory and hence the success rate of the fertilization. We have studied the effect of unbounded simple shear flow and Poiseuille flow on the sperm trajectory. The sperm moves on an elliptical trajectory in the reference frame advecting with the local background flow in the simple shear flow and the length of the major-axis of this elliptical trajectory decreases with the shear rate. In the presence of Poiseuille flow, the sperm moves downstream or upstream depending on the flow strength. The sperm also moves toward the centerline in a Poiseuille flow. The cross-stream migration velocity of sperm decreases as the transverse distance of the sperm from the centerline decreases in the close vicinity of the centerline, while it increases far away from the centerline. We use sperm number, a dimensionless number representing the ratio of viscous force to elastic force, to study the effect of flagellar flexibility on the sperm trajectory. The length of the major axis of the elliptical trajectories increases with the sperm number in the simple shear flow and the cross-stream migration velocity of the sperm increases with the sperm number in a Poiseuille flow.

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