Abstract Submitted
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Shear alters motility of *Escherichia coli*[1] MEHDI MOLAEI, MARYAM JALALI, JIAN SHENG, Texas Tech University — Understanding of locomotion of microorganisms in shear flows drew a wide range of interests in microbial related topics such as biological process including pathogenic infection and biophysical interactions like biofilm formation on engineering surfaces. We employed microfluidics and digital holography microscopy to study motility of *E. coli* in shear flows. We controlled the shear flow in three different shear rates: 0.28 s^{-1}, 2.8 s^{-1}, and 28 s^{-1} in a straight channel with the depth of 200 μm. Magnified holograms, recorded at 15 fps with a CCD camera over more than 20 minutes, are analyzed to obtain 3D swimming trajectories and subsequently used to extract shear responses of *E.coli*. Thousands of 3-D bacterial trajectories are tracked. The change of bacteria swimming characteristics including swimming velocity, reorientation, and dispersion coefficient are computed directly for individual trajectory and ensemble averaged over thousands of realizations. The results show that shear suppresses the bacterial dispersions in bulk but promote dispersions near the surface contrary to those in quiescent flow condition. Ongoing analyses are focusing to quantify effect of shear rates on tumbling frequency and reorientation of cell body, and its implication in locating the hydrodynamic mechanisms for shear enhanced angular scattering.

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