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Tumbling and quasi-tumbling motions of E.coli over a solid surface under shear flows[1] MEHDI MOLAEI, JIAN SHENG, Texas Tech University — Flow shear is known to alter bacterial motility by inducing Jeffery Orbit, rheotaxis, and trapping cells in the high shear region. Over a solid surface flow shear Interferes with hydrodynamic interaction of cells with solid surface. Our previous study shows that in the quiescent condition the tumbles of wild *E.coli* are suppressed and tumbling reorientation of cells is restricted to the surface parallel direction. In the current study, we exposed bacteria to the well controlled shear flows inside a microchannel and applying Digital Holography Microscopy to track them over time. The results show that flow shear promotes tumbling of *E.coli* and preserve reorientation of the cells during tumbles. Our hydrodynamic model indicates that in the low shear levels the tumble enhancement is due to shear induced flagella unbundling, while in the high shear flow regime, Jeffery Orbit causes rapid cell re-orientation which causes quasi-tumbles with similar angular displacement one would expect during a tumbling.

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