Abstract Submitted
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**Flow shear induced cross-stream migration by a green alga**[1] ANWAR CHENGALA, Student, MIKI HONDZO, JIAN SHENG, Professor — Swimming and migration characteristics of micro-organisms in shear flows has overarching implications in formation of biological thin layers in aquatic ecosystems, design of bioreactors, and cell separations. Experiments are conducted in a microfluidic channel using digital holographic microscopy. A motile micro-alga, *Dunaliella primolecta,* is studied in a laminar shear flow at maximum shear rates ranging from 0.1 to 25 $s^{-1}$. It is found that *D. primolecta* cells aggregate in the direction of positive vorticity when a critical local shear rate of 5 $s^{-1}$ is reached. Unlike nonmotile cells, D. *primolecta* in high shear flow do not rotate along the Jeffrey orbits, neither resumes the local vorticity of flow. The torque on cell body is counter-acted by the spatial alignment of beating flagella. It is speculated that under severe viscous stresses, motile cells "opt" to align themselves in the direction where the least stresses are experienced on cell wall. Beating of flagella, which prevents cells from assuming local flow vorticity, consequently propel them in the span wise direction and allow them to disperse only in a thin two-dimensional layer.

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