

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Investigation of the Swimming and Flagellar Dynamics of Shear guided Motile Alga¹ ANWAR CHENGALA, MIKI HONDZO, Department of Civil Engineering, University of Minnesota, JIAN SHENG, Department of Aerospace Engineering and Mechanics, University of Minnesota — We examine the behavior of force-free swimming cell in a shear flow having spheroidal bodies with two flagella located at the anterior part of the cell that uses breast-like motion for its propulsion. The cell, *Dunaliella primolecta*, displays a unique behavior of propelling along the local vorticity direction in a linear shear flow. The cell rotation is absent during this display and the flagella beating is observed to be asynchronous. The forces and moments generated by the flagella are estimated numerically. Based on the Resistive Force Theory approach, we attempt to demonstrate that the moments generated by beating flagella and their alignment to flow are necessary to counter-act the vorticity of the flow. In addition, we explore the various mechanisms that cell may use to re-orient while in a shear flow as well as how critical the variations in the flagellar beating pattern are to a cell's swimming dynamics.

¹NSF (No: CBET-0844647), Minnesota Futures Grant

Anwar Chengala
Department of Civil Engineering, University of Minnesota

Date submitted: 05 Aug 2011

Electronic form version 1.4