Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Swimming of bacteria under dielectrophoresis NGOC PHU TRAN, MARCOS MARCOS[1], School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore — In this work, we present a model to predict the response of a swimming helically flagellated bacterium to a unidirectional dielectrophoretic (DEP) force with its strength varying linearly in space. We employ resistive force theory to compute the hydrodynamic force on the flagellar bundle, and the effects of DEP force and rotational diffusion are examined using the Fokker-Planck equation. The DEP force greatly contributes to the reorientation of the bacterium such that the bacterium's primary axis is aligned with the direction of the force. Interestingly, when the DEP strength varies perpendicularly to the direction of the force, the bacterium's primary axis is no longer aligned with the DEP force, which results in a translation of the bacterium perpendicular to its primary axis. Finally, we show the feasibility to utilize this phenomenon to achieve bacterial focusing.

[1]The full name of the second author is MARCOS.

Ngoc Phu Tran
School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore

Date submitted: 05 Nov 2015 Electronic form version 1.4