Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

A numerical model of localized convection cells of Euglena suspensions[1] MAKOTO IIMA, ERIKA SHOJI, TAKAYUKI YAMAGUCHI, Hiroshima University — Suspension of Euglena gracilis shows localized convection cells when it is illuminated form below with strong light intensity. Experiments in an annular container shows that there are two elementary localized structures. One consists of a pair of convection cells and a single region where number density of Euglena is high. The other consists a localized traveling wave [1]. Based on the measurements of the flux of number density, we propose a model of bioconvection incorporating lateral phototaxis effect proportional to the light intensity gradient. Using pseudo spectral method, we performed numerical simulation of this model. We succeed in reproducing one of the localized structures, a convection pair with single region of high number density. Also, when the aspect ratio is large, there are a parameter region where the localized structure and conductive state are both stable, which is suggested by experiments [1]. Spatial distribution of the number density implies that the accumulation of microorganism due to the convective flow causes such bistability.

[1] Localized bioconvection patterns and their initial state dependency in Euglena suspensions in an annular container, E. Shoji, H. Nishimori, A. Awazu, S. Izumi, and M. Iima, J. Phys. Soc. Jpn. 83(2014)04300

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Date submitted: 01 Aug 2014 Electronic form version 1.4