

Abstract Submitted  
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**Gyrotactic Bioconvection in Density-Stratified Fluids**<sup>1</sup> ALIREZA KARIMI, AREZOO ARDEKANI, University of Notre Dame — Bioconvection is a complex phenomenon causing spontaneous pattern formation in some biological systems, for instance in bacterial, algal, and ciliate cultures. It occurs as a result of the collective behavior of up-swimming microorganisms in response to the certain types of physical stimuli. We are interested in the special case of gyrotaxis where the swimming is directed by the balance of the viscous torque arising from shear flow and the torque due to gravity acting on a bottom-heavy cell. We investigate gyrotactic bioconvection in the presence of a temperature or salinity stratification, using large-scale numerical simulations of a continuum model consisting of Navier-Stokes equations with Boussinesq approximation coupled with two conservation equations for the concentration of microorganisms and stratified agent. We explore different regimes of the flow by varying the corresponding dimensionless variables such as Rayleigh number and Lewis number, to shed light on the characteristics of double-diffusive convection engendered by active swimmers in a stratified environment.

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