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SIMILARITY SOLUTION FOR THE FALLING PLUMES IN A GRAVITY MODULATED BIOCONVECTION

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ABSTRACT

The study of bacterial bioconvection is an emerging area of interest as the world's major portion consists of bio-mass. The phenomenon of bioconvection has its wide applications in biological, physiological and dynamical system. In many physical situations, gravity is no longer a constant. Therefore, the purpose of the present investigation is to attempt to quantify observations of pattern formation by swimming microorganisms in a gravity modulated environment. Very sparse literature exists in this field. Therefore, in order to provide qualitative as well as quantitative results the present investigation is carried out. In this paper, the axisymmetric case is considered in detail and similarity solutions are obtained for falling plumes in bioconvection in a gravity modulated environment. The results are computed using a fast computational technique. Our results are in excellent agreement with the available results in the unmodulated environment.

KEYWORDS: Axisymmetric Plumes, Bacterial Bioconvection, Cell Concentration, Chemotactic, Gravity Modulation, Similarity Solution