Mathematical models of bacteria chemotaxis

Phindile Dumani, Michael Chapwanya
Department of Mathematics and Applied Mathematics, University of Pretoria

Keywords: Bacteria-chemotaxis; reaction-diffusion;

Biofilm appears to be the preferred form of life for bacteria in many environments under different conditions. The cells embed themselves in a slimy extracellular matrix, usually adhered to surfaces or suspended in a liquid. However, in the presence of a chemical stimulant, they tend to move randomly depending on whether the conditions are deemed attractive or repellent with a possibility of forming patterns. This phenomenon is known as chemotaxis.

In this talk, we review the literature on mathematical models of bacterial chemotaxis. The formulated mathematical models are in the form of nonlinear strongly coupled reaction-diffusion-chemotaxis systems of equations and the main challenge is finding representative solutions. In our study, we apply the well-known Douglas-Gunn splitting method.