

**Title:** Homotopy Analysis of Bacterial Growth using Diffusion Reaction Model for Colonial Development

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**Abstract:**

we consider bacterial growth model and investigate the need for fractional derivative compared to the classical derivative in time. We describe the dynamics of the bacteria and the nutrients by two reaction diffusion equations, also we make use of the technique called  $q$ -Homotopy Analysis Method on the resulting time-fractional partial differential equations and obtain the analytical solution.