

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**A STUDY OF THE HOMOTOPY PERTURBATION METHOD IN
SOLVING FISHER'S EQUATION**

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ABSTRACT

In this research, the solution to Fisher's equation are examined using the Homotopy Perturbation Method. A partial differential equation called Fisher's equation, also referred to as the Fisher-Kolmogorov equation or simply the FE, describes the spatiotemporal dynamics of a population that is experiencing diffusion and logistic growth. The HPM is an effective analytical method that offers approximations for solutions to nonlinear issues. The FE solution is obtained as a power series with unknown coefficients by including a homotopy parameter. By contrasting it with current numerical techniques and exact solutions when available, the convergence and accuracy of the HPM solution are evaluated. This work fills this knowledge gap by advancing understanding and offering helpful information to researchers. The objectives involved showing how well the HPM works to solve FE using Maple Software and determining the absolute error. The methodology includes an exploration of concentrating on employing the HPM to solve FE manually with different initial conditions. The findings show how well the HPM works to solve Fisher's equation, offering a useful alternative method for researching population dynamics and related phenomena. This study advances our knowledge of how the HPM can be applied to nonlinear dynamics and mathematical biology. This study found that the FE has a different absolute error with a different initial condition.