

An Approximate Analytical Solution of the Fractional Diffusion Equation with Absorbent Term and External Force by Homotopy Perturbation Method

Subir Das and Praveen Kumar Gupta

Department of Applied Mathematics Institute of Technology, Banaras Hindu University Varanasi – 221 005, India

Reprint requests to S. D.; E-mail: subir_das08@hotmail.com

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In the present paper, the approximate analytical solutions of a general diffusion equation with fractional time derivative in the presence of an absorbent term and a linear external force are obtained with the help of the powerful homotopy perturbation method (HPM). By using initial values, the approximate analytical solutions of the equation are derived. The results are deduced for different particular cases. The numerical results show that only a few iterations are needed to obtain accurate approximate solutions and these are presented graphically. The presented method is extremely simple, concise, and highly efficient as a mathematical tool in comparison with the other existing techniques.

Key words: Fractional Diffusion Equation, Fractional Brownian Motion, Homotopy Perturbation Method, Mittag-Leffler Function.