

Operational Matrix Method for Fuzzy Fractional Reaction Diffusion Equation

Authors : Sachin Kumar

Abstract : Fuzzy fractional diffusion equation is widely useful to depict different physical processes arising in physics, biology, and hydrology. The motive of this article is to deal with the fuzzy fractional diffusion equation. We study a mathematical model of fuzzy space-time fractional diffusion equation in which unknown function, coefficients, and initial-boundary conditions are fuzzy numbers. First, we find out a fuzzy operational matrix of Legendre polynomial of Caputo type fuzzy fractional derivative having a non-singular Mittag-Leffler kernel. The main advantages of this method are that it reduces the fuzzy fractional partial differential equation (FFPDE) to a system of fuzzy algebraic equations from which we can find the solution of the problem. The feasibility of our approach is shown by some numerical examples. Hence, our method is suitable to deal with FFPDE and has good accuracy.

Keywords : fractional PDE, fuzzy valued function, diffusion equation, Legendre polynomial, spectral method

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