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## Approximate analytical solution for the Cauchy fuzzy reaction-diffusion equation via method of directly defining the inverse mapping

Karunarathna W.H.D.T. \*, Samarakoon S.M.P.T.B. and  
Dewasurendra M.T.M.

*Department of Mathematics, University of Peradeniya, Peradeniya, Sri Lanka.*

This work employs the Method of Directly Defining the inverse Mapping (MDDiM) to obtain an approximate analytical solution for a fuzzy partial differential equation (FPDE). The FPDEs have attracted a great deal of attention among scientists and engineers, because of its frequent involvement in the modeling of industrialized applications, such as heat and mass transfer, electromagnetic fields, and many others. The numerical and analytical solutions of FPDEs have been investigated by numerous authors using various numerical and analytical methods. The MDDiM was applied to calculate the solution of fuzzy reaction-diffusion equation (FRDE) by considering the first three terms of the series solution. This is the first time someone used the MDDiM to solve FPDEs. Here, we obtained an approximate analytical solution by considering the upper bound and lower bound solutions. The best value of the convergence control parameter was determined by minimizing the square residual error of the MDDiM solution. The results that we obtained here agreed very well with the exact solution of Cauchy FRDE. The main achievement of this study is the demonstration of the successful application of the MDDiM in obtaining an analytical solution of the Cauchy FRDE.

**Keywords:** Analytical solution, Cauchy fuzzy reaction-diffusion equation, Fuzzy partial differential equation, Method of directly defining the inverse mapping, Series solution

\*Corresponding author: [dulashinikarunarathna111@gmail.com](mailto:dulashinikarunarathna111@gmail.com)