A Modified Fractional Physics-Informed Neural Networks for Solving Fractional Reaction-Diffusion Problems

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Abstract

This paper introduces an innovative approach featuring a modified fractional Physics-Informed Neural Network (fPINN) that effectively tackles the challenges associated with fractional convection-diffusion problems. These problems often pose difficulties for traditional numerical methods, especially in high-dimensional spaces or complex geometries. Numerical experiments were conducted using a well-defined 2D benchmark example to demonstrate the effectiveness of the proposed framework. The results indicate that this framework significantly improves the performance of radial basis function neural networks, making them better suited for handling complex fractional models.

Keywords: fractional PINN, fractional convection-diffusion equations, weak singular solution

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