Numerical Investigation of the Fractal Mobile/Immobile Transport Model with Caputo and Caputo-Fabrizio Fractional Derivatives using Finite difference/Spectral Approximations

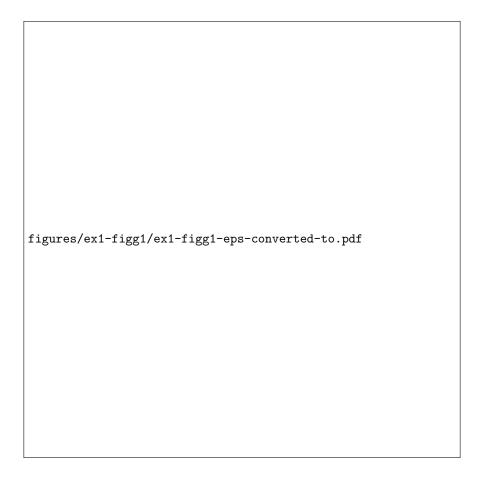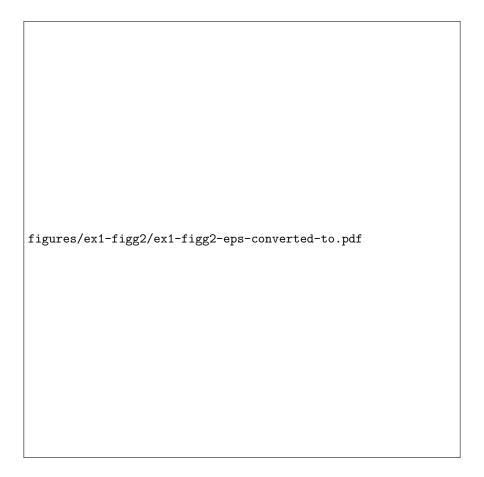Mojtaba Fardi[1]

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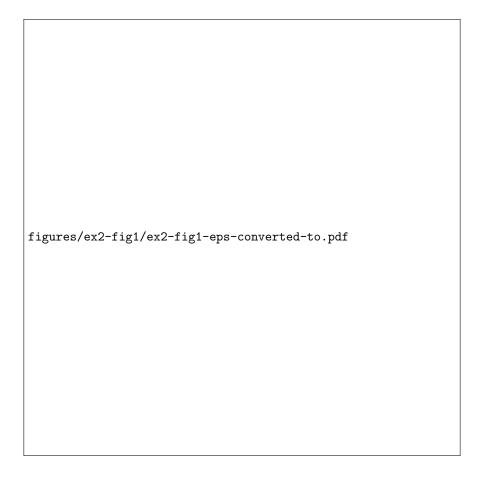
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Abstract

This paper discusses a spectral collocation method for numerically solving linear and nonlinear fractal Mobile/Immobile transport model with Caputo and Caputo-Fabrizio fractional derivatives. In the time direction, a finite difference scheme is used to approximate the differential term. Also, for space discretization, we apply the Chebyshev-spectral method. The unconditional stability and convergence of the proposed method are investigated, which provides the theoretical basis of the proposed method for solving the considered equation. Finally, some numerical experiments are considered to examine the efficiency and applicability of it in the sense of accuracy and convergence ratio.
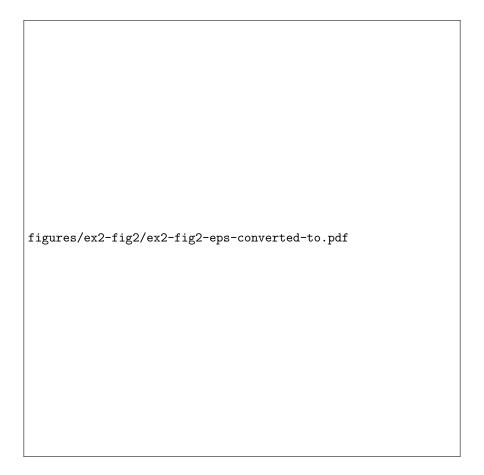
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