

Method of approximate particular solutions for fractional subdiffusion problems

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In recent decades, the theoretical researches and experimental results show that the contaminant transport through complex porous media can be described by fractional subdiffusion model. Consequently, growing attention has been attracted to numerical solution of fractional subdiffusion model. This paper applies the method of approximate particular solutions (MAPS) to fractional subdiffusion problems, e.g. time fractional diffusion equations (TFDEs). In the discretization formulation, the finite difference scheme and the MAPS are respectively used to discretize time fractional derivative and spatial derivative terms. The MAPS is an alternative radial basis function (RBF) method, which is defined in terms of linear combination of the particular solutions of the inhomogeneous governing equations with TPS-RBF as the source term. Numerical investigation demonstrates that the present meshless scheme is highly accurate and computationally efficient for 2D and 3D TFDEs.

Keywords: Method of particular solutions, Meshless, Time fractional derivative, Subdiffusion, Radial basis function