

Radial basis function method for multidimensional elliptic equation with nonlocal conditions

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Various real-world processes often can be described by mathematical models consisted of partial differential equations (PDEs) with nonlocal conditions. Therefore, methods for the numerical solution of PDEs with various types of nonlocal conditions receive a lot of attention in the literature.

We consider a multidimensional elliptic equation with classical Dirichlet boundary condition and nonlocal integral conditions [1], [2]. For the solution of the problem we apply a method based on radial basis function (RBF) collocation technique [3]. Recently, RBF-based meshless methods have been successfully applied for the solution of various differential problems, including one- or two-dimensional evolution [4]–[7] or steady [8] PDEs with nonlocal boundary conditions. This work is dedicated for the solution of multidimensional elliptic problem formulated on complexly shaped domain. Various properties of the method are investigated by solving two- and three-dimensional examples. The results of numerical study are presented and discussed.

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