

Localized Method of Particular Solutions Based on Matern Functions for Solving Modified Helmholtz Equations

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Localized Method of Particular Solution is a kind of innovative local method for solving large-scale partial differential equations. So far, in the application of LMPS, MQ has been widely selected as the RBF kernel function due to its superior performance. However, the difficulty of determining the shape parameter of MQ affects the stability and accuracy of this method. In addition, LMPS has not been used to solve modified Helmholtz equations because the particular solutions can not be obtained when using MQ as basis function. In this paper, we apply Matern functions for the first time as the basis functions to solve modified Helmholtz equations by using LMPS. We propose an ingenious and simple way to derive particular solutions of modified Helmholtz operator by taking advantage of the known fundamental solutions. Numerical examples verify the effectiveness and stability of the proposed method.

Keywords: partial differential equations, modified Helmholtz, LMPS, Matern function, fundamental solution, particular solution