

ON THE OPTIMAL SHAPE PARAMETER FOR GAUSSIAN RADIAL BASIS FUNCTION FINITE DIFFERENCE APPROXIMATION OF THE POISSON EQUATION

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TÓM TẮT:

We investigate the influence of the shape parameter in the meshless Gaussian radial basisfunction finite difference (RBF-FD) method with irregular centres on the quality of the approximation of the Dirichlet problem for the Poisson equation with smooth solution. Numerical experiments show that the optimal shape parameter strongly depends on the problem, but insignificantly on the density of the centres. Therefore, we suggest a multilevel algorithm that effectively finds a near-optimal shape parameter, which helps to significantly reduce the error. Comparison to the finite element method and to the generalised finite differences obtained in the flat limits of the Gaussian RBF is provided.