Chandhini, G.; **Sanyasiraju, Y. V. S. S.**

Local RBF-FD solutions for steady convection – diffusion problems. (English) Zbl 1194.76174

Int. J. Numer. Methods Eng. 72, No. 3, 352-378 (2007).

Summary: This paper describes the application of radial basis function (RBF) based finite difference type scheme (RBF-FD) for solving steady convection – diffusion equations. Numerical studies are made using multiquadric (MQ) RBF. By varying the shape parameter in MQ, the accuracy of the solution is seen to be highly improved for large values of Reynolds' numbers. The developed scheme has been compared with the corresponding finite difference scheme and found that the solutions obtained using the former are non-oscillatory.

MSC:

76M20 Finite difference methods applied to problems in fluid mechanics
76R99 Diffusion and convection

Keywords:

radial basis function; convection-diffusion equation; multiquadric; finite difference

Full Text: DOI

References:

[1] Kansa, Computers and Mathematics with Applications 19 pp 147– (1990) · Zbl 0692.76003

[2] Solving partial differential equations by collocation with radial basis functions. In Surface Fitting and Multiresolution Methods, , (eds). Vanderbilt University Press: Nashville, TN, 1997; 131–138. · Zbl 0938.65140

[3] Wu, Approximation Theory and Applications 8 pp 1– (1992)

[4] Hon, Applied Mathematics and Computation 119 pp 177– (2001)

[5] Chen, Computer Methods in Applied Mechanics and Engineering 192 pp 1859– (2003)

[6] Chen, Computers and Mathematics with Applications 43 pp 379– (2002)

[7] Chen, Boundary Elements 20 pp 495– (1998)

[8] Wong, Computers and Mathematics with Applications 37 pp 23– (1999)

[9] Beatson, Advances in Computational Mathematics 11 pp 253– (1999)

[10] Ling, Advances in Computational Mathematics 23 pp 31– (2005)

[11] Wendland, Advances in Computational Mathematics 4 pp 389– (1995)

[12] Wright, Journal of Computational Physics 212 pp 99– (2006)

[13] Driscoll, Computers and Mathematics with Applications 43 pp 413– (2002)

[14] Hardy, Journal of Geophysical Research 76 pp 1905– (1971)

[15] Franke, Mathematics of Computation 38 pp 181– (1982)

[16] Fornberg, Computers and Mathematics with Applications 48 pp 853– (2004)