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Nota di contenuto	1. Introduction -- 1.1 Radial basis functions -- 1.2 Applications -- 1.3 Contents of the book -- 2. Summary of methods and applications -- 2.1 Invertibility of interpolation matrices -- 2.2 Convergence analysis -- 2.3 Interpolation and convergence -- 2.4 Applications to PDEs -- 3. General methods for approximation and interpolation -- 3.1 Polynomial schemes -- 3.2 Piecewise polynomials -- 3.3 General nonpolynomial methods -- 4. Radial basis function approximation on infinite grids -- 4.1 Existence of interpolants -- 4.2 Convergence analysis -- 4.3 Numerical properties of the interpolation linear system -- 4.4 Convergence with respect to parameters in the radial functions -- 5. Radial basis functions on scattered data -- 5.1 Nonsingularity of interpolation matrices -- 5.2 Convergence analysis -- 5.3 Norm estimates and condition numbers of interpolation matrices -- 6. Radial basis functions with compact support -- 6.1 Introduction -- 6.2

Wendland's functions -- 6.3 Another class of radial basis functions with compact support -- 6.4 Convergence -- 6.5 A unified class -- 7. Implementations -- 7.1 Introduction -- 7.2 The BFGP algorithm and the new Krylov method -- 7.3 The fast multipole algorithm -- 7.4 Preconditioning techniques -- 8. Least squares methods -- 8.1 Introduction to least squares -- 8.2 Approximation order results -- 8.3 Discrete least squares -- 8.4 Implementations -- 8.5 Neural network applications -- 9. Wavelet methods with radial basis functions -- 9.1 Introduction to wavelets and prewavelets -- 9.2 Basic definitions and constructions -- 9.3 Multiresolution analysis and refinement -- 9.4 Special constructions -- 10. Further results and open problems -- 10.1 Further results -- 10.2 Open problems -- Appendix: Some essentials on Fourier transforms.

Sommario/riassunto

In many areas of mathematics, science and engineering, from computer graphics to inverse methods to signal processing, it is necessary to estimate parameters, usually multidimensional, by approximation and interpolation. Radial basis functions are a powerful tool which work well in very general circumstances and so are becoming of widespread use as the limitations of other methods, such as least squares, polynomial interpolation or wavelet-based, become apparent. The author's aim is to give a thorough treatment from both the theoretical and practical implementation viewpoints. For example, he emphasises the many positive features of radial basis functions such as the unique solvability of the interpolation problem, the computation of interpolants, their smoothness and convergence and provides a careful classification of the radial basis functions into types that have different convergence. A comprehensive bibliography rounds off what will prove a very valuable work.