

Bellomo, N.

Nonlinear models and problems in applied sciences from differential quadrature to generalized collocation methods. (English) Zbl 0898.65074

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Mathematical methods for nonlinear problems in applied sciences are investigated. The contents are based on a quadrature method proposed by *R. Bellmann*, *B. G. Kashef* and *J. Casti* [*J. Comput. Phys.* 10, 40-52 (1972; [Zbl 0247.65061](#))], which leads to the so called generalized collocation method. First, a general description is given. Then recent developments concerning integro-differential equations, domain decomposition and stochastic problems are discussed. Finally, improvements in the algorithms and computation of error estimates are given.

Reviewer: [W.Heinrichs \(Essen\)](#)

MSC:

- [65N35](#) Spectral, collocation and related methods for boundary value problems involving PDEs Cited in **37** Documents
- [65R20](#) Numerical methods for integral equations
- [45K05](#) Integro-partial differential equations
- [60H15](#) Stochastic partial differential equations (aspects of stochastic analysis)
- [65N15](#) Error bounds for boundary value problems involving PDEs
- [65N55](#) Multigrid methods; domain decomposition for boundary value problems involving PDEs
- [35J65](#) Nonlinear boundary value problems for linear elliptic equations
- [65C99](#) Probabilistic methods, stochastic differential equations

Keywords:

differential quadrature method; nonlinear problems; collocation method; integro-differential equations; domain decomposition; stochastic problems; algorithms; error estimates

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