

Collocation methods for Volterra equations with delay arguments

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This talk is a survey of recent results and open problems regarding optimal convergence estimates for piecewise polynomial collocation solutions to nonlinear Volterra integral and integro-differential equations with linear or nonlinear delay arguments. Of particular interest will be equations whose Volterra integral operators have (integrable) kernel singularities of algebraic or logarithmic type. The results obtained in this analysis represent a first step towards a better understanding of the superconvergence properties of collocation methods for corresponding systems of integral-algebraic equations, as well as for Volterra functional equations with state-dependent delays. The talk concludes with comments on various aspects of the numerical implementation and the limitations of piecewise polynomial collocation methods.