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Numerical approximations for population growth model by rational Chebyshev and Hermite functions collocation approach: a comparison. (English) Zbl 1204.65159
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Summary: This paper aims to compare rational Chebyshev (RC) and Hermite functions (HF) collocation approach to solve Volterra’s model for population growth of a species within a closed system. This model is a nonlinear integro-differential equation where the integral term represents the effect of toxin. This approach is based on orthogonal functions, which will be defined. The collocation method reduces the solution of this problem to the solution of a system of algebraic equations. We also compare these methods with some other numerical results and show that the present approach is applicable for solving nonlinear integro-differential equations.

MSC:
65R20 Numerical methods for integral equations
92D25 Population dynamics (general)
45J05 Integro-ordinary differential equations
45G10 Other nonlinear integral equations
45D05 Volterra integral equations

Keywords:
collocation method; spectral method; Volterra’s population model; nonlinear integro-differential equation; Hermite functions; rational Chebyshev; population growth model; numerical results

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