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A Comparative Study of Approaches for Solving Lotka-Volterra Equations

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Abstract

In this study, the application of the Hermite collocation method [2-3] to obtain approximate solutions of the Lotka-Volterra equations modelling ecosystem dynamics is investigated. The Lotka-Volterra equations consist of two differential equations describing predator-prey relationships and population dynamics [1], and analytical solutions of these systems are often complex and difficult. Therefore, numerical approximation methods gain importance in the solution of these equations.

In my study, suitable collocation points are selected depending on the dynamic characteristics of the considered system and an approach for the solution of the system with Hermite polynomials is established. The results show that the Hermite collocation method provides sufficient accuracy and computational efficiency for the Lotka-Volterra equations. Moreover, the approximate solutions obtained are presented graphically and analysed in comparison with other numerical methods [4-5].

***K*eywords** Lotka-Volterra equations · Systems of nonlinear differential equations · Hermite collocation method

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