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Abstract: In this paper we undertake to consider the inverse problem of parameter identification of nonlinear system of ordinary differential equations for a specific case of complete information about solution of the Holling-Tanner model for finite number of points for the finite time interval. In this model the equations are nonlinearly dependent on the unknown parameters. By means of the proposed transformation the obtained equations become linearly dependent on new parameters functionally dependent on the original ones. This simplification is achieved by the fact that the new set of parameters becomes dependent and the corresponding constraint between the parameters is nonlinear. If the conventional approach based on introduction of the Lagrange multiplier is used this circumstance will result in a nonlinear system of equations. A novel algorithm of the problem solution is proposed in which only one nonlinear equation instead of the system of six nonlinear equations has to be solved. Differentiation and integration methods of the problem solution are implemented and it is shown that the integration method produces more accurate results and uses less number of points on the given time interval.

Keywords: parameter estimation, goal function, absolute error curves, inverse method, Holling-Tanner model, least square method, differentiation method, integration method