

Representation of the Solution of One Dynamical System on the Plane

Authors : Kushakov Kholmurodjon, Muhammadjonov Akbarshox

Abstract : This present paper is devoted to a system of second-order nonlinear differential equations with a special right-hand side, exactly, the linear part and a third-order polynomial of a special form. It is shown that for some relations between the parameters, there is a second-order curve in which trajectories leaving the points of this curve remain in the same place. Thus, the curve is invariant with respect to the given system. Moreover, this system is invariant under a non-degenerate linear transformation of variables. The form of this curve, depending on the relations between the parameters and the eigenvalues of the matrix, is proved. All solutions of this system of differential equations are shown analytically.

Keywords : dynamic system, ellipse, hyperbola, Hess system, polar coordinate system

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