Integrability and zero-Hopf bifurcation in the Sprott A system

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A R T I C L E   I N F O

A B S T R A C T

The first objective of this paper is to study the Darboux integrability of the polynomial differential system

$$\dot{x} = y, \quad \dot{y} = -x - yz, \quad \dot{z} = y^2 - a$$

and the second one is to show that for $a > 0$ sufficiently small this model exhibits one small amplitude periodic solution that bifurcates from the origin of coordinates when $a = 0$. This model was introduced by Hoover as the first example of a differential equation with a hidden attractor and it was used by Sprott to illustrate a differential equation having a chaotic behavior without equilibrium points, and now this system is known as the Sprott A system.

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