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STRANGE ATTRACTORS

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Abstract. There have been various definitions of strange attractors, some chaotic, some not. In this paper,only chaotic strange attractors are discussed. Further, strange attractors are presented that differ significantly from the original definition of Ruelle and Takens [1] which required that the attractor have a fractal form.

Strange attractors presented in this paper are geometrically complex and, in addition, their forms are representative of geometric forms that appear in the natural world.

Attractors in this paper arise from three sources: (1) the unstable manifolds of hyperbolic fixed points; (2)arise from systems that combine Bernoulli and almost periodic functions; or (3) are a combination of the previously noted two forms. All equations of attractors presented are in closed-form in terms of elementary functions.

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1 Introduction:Origin of Geometric Strange Attractors

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A common form of a dynamical system occurring in nature is the Duffing/Ueda equation, which is:

$$\ddot{x} + \alpha \dot{x} + x^3 = \beta \cos(t) \tag{1}$$

Dissecting Eq. 1 into its primary dynamical parts in IDE form, the elliptic functions has been replaced by

$$\exp(h f(\mathbf{X}) \mathbf{B})$$