

Modulated nonlinear processes and a novel mechanism to induce chaos

Rössler, Jaime

Kiwi, Miguel

Hess, Benno

Markus, Mario

Many natural phenomena are governed by nonlinear recursive relations of the type $x_{t+1}=f(x_t)$, where f does depend on t . We focus our interest on the particularly simple case $x_{t+1}=r_t x_t(1-x_t)$, where r_t adopts either periodically or at random the values A and B . Graphical representations of the Lyapunov exponent on the AB plane show unexpected features, like self-similarity and early chaos (i.e., chaos for very low parameter values). In relation with the latter we discuss a novel mechanism to induce chaotic behavior. The meaning of the Lyapunov exponent for random processes is examined. © 1989 The American Physical Society.