Characterizing the attractors of chaotic systems by a direct measurement method

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Abstract

Due to the high sensitivity to internal parameters, the operation of the chaotic systems may couple strongly to the ambient and are apt to detect small variations of external factors that influence the internal ones. We present details of a method and related equipment for analyzing and characterizing the behavior of chaotic systems, suited for assessing changes in the dynamics. The method essentially consists in determining the probability that the trajectory of the chaotic system is located in a specified region of the phase space. The method is based on the measurement of the time intervals spent by the trajectory in the specified phase space interval. The measuring equipment is a high precision time measuring one, based on microcontrollers. We exemplify the method by assessing the dependency of the behavior of a chaotic electronic circuit on the variation of the power supply voltage.

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