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On-Off Intermittency in Continuum Systems Driven by the Chen System

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Abstract: Previous studies on on-off intermittency in continuum systems are generally based on the synchronization of identical chaotic oscillators or in nonlinear systems driven by the Duffing oscillator. In this paper, one-state on-off intermittency and two-state on-off intermittency are observed in two five-dimensional continuum systems, respectively, where each system has a two-dimensional subsystem driven by the chaotic Chen system. The phenomenon of intermingled basins is observed below the blowout bifurcation. Basic statistical properties of the intermittency are investigated. It is shown that the distribution of the laminar phase follows a -3/2 power law, and that of the burst amplitudes follows a -1 power law, consistent with the basic statistical characteristics of on-off intermittency.

Keywords: on-off intermittency; Chen system; Blowout bifurcation; intermingled basin; power law;

AMS Subject Classification: 37C70; 93C10;

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