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Dynamical complexity and extreme value statistics

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A theory of extremes for deterministic dynamical systems generating complex behavior is outlined. Signatures of the deterministic character of the dynamics are identified, and the extent to which the results can be reduced for practical purposes to the classical statistical theory of extremes is discussed. The general ideas are illustrated on three case studies: the structure of the cumulative probability distribution of extremes, Fn(x), in the presence of quasi-periodic motion; the transient evolution of their mean and variance as a function of the time window, n, in bistable systems; and the value of the Hurst exponent in the presence of fully developed chaos and intermittent chaos.