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Spatiotemporal intermittency and scaling laws in the coupled sine circle map lattice

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We study spatio-temporal intermittency (STI) in a system of coupled sine circle maps. The phase diagram of the system shows parameter regimes with STI of both the directed percolation (DP) and non-DP class. STI with synchronized laminar behaviour belongs to the DP class. The regimes of non-DP behaviour show spatial intermittency (SI), where the temporal behaviour of both the laminar and burst regions is regular, and the distribution of laminar lengths scales as a power law. The regular temporal behaviour for the bursts seen in these regimes of spatial intermittency can be periodic or quasi-periodic, but the laminar length distributions scale with the same power-law, which is distinct from the DP case. STI with traveling wave (TW) laminar states also appears in the phase diagram. Soliton-like structures appear in this regime. These are responsible for cross-overs with accompanying non-universal exponents. The soliton lifetime distributions show power law scaling in regimes of long average soliton life-times, but peak at characteristic scales with a power-law tail in regimes of short average soliton life-times. The signatures of each type of intermittent behaviour can be found in the dynamical characterisers of the system viz. the eigenvalues of the stability matrix. We discuss the implications of our results for behaviour seen in other systems which exhibit spatio-temporal intermittency.