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Universality in Coupled Maps

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We review recent studies of the critical behavior of period-doubling in two coupled one-dimensional (1D) maps. In the linear coupling case, in which the leading term of coupling is linear, the critical set (the set of critical points) consists of an infinite number of line segments and the zero coupling point, whereas in the nonlinear coupling case only one critical line constitutes the critical set. There are three (two) kinds of critical behaviors in the linear (nonlinear) coupling case, characterized with different stability multipliers and parameter scaling factors associated with coupling. As implied by the above numerical observation, a renormalization analysis gives coincident results, which leads to the conclusion that the critical behavior of two coupled maps is universal and can be classified in terms of the nature of coupling. A straightforward extension to many couple maps is also included.

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