

Properties of master stability islands for amplitude death in networks of delay-coupled oscillators

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Amplitude death is a dynamical phenomenon in which a network of oscillators settles to a fixed point as a result of coupling. A master stability function can be used to analyze the stability of the amplitude death state. The master stability function for a delay-coupled network requires three inputs: time delay, coupling strength, and the eigenvalues of a coupling matrix. Master stability functions can be used to generate master stability islands for a chosen nonlinear system (node dynamics) and coupling function. Master stability islands are two-dimensional subsets of the delay-coupling parameter space, together with a third dimension “altitude”. The altitude provides the eigenvalues of the coupling matrix that result in stable amplitude death. This work describes properties of master stability islands and presents examples of master stability islands for several common chaotic systems.