Coupling dynamical systems: a geometrical and computational approach

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Roughly speaking, coupled dynamical systems are systems of ODEs which are interconnected through some definite functions on the variables of the equations, so that the output of one or several of those equations have an impact on the time evolution of the whole system. On the other hand, coupling dynamical systems is a useful mechanism to investigate and understand how synchronicity occurs in the physical world, since both, coupling and synchronization are ubiquitous phenomena throughout nature. Moreover, systems of coupled oscillators or cell systems have been extensively used as models for physical or biological systems. In this talk, we explore different paths on how to achieve synchronization of coupled dynamical systems and address several examples of synchronicity in well known periodic, and chaotic systems. In particular, for coupled chaotic systems it is quite remarkable how synchronized behaviour can be obtained since chaos is characterized by a highly sensitive dependence on initial conditions.

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