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Impulsive Synchronization of Complex Networks: an Event-Triggered Pinning Algorithm

Complex networks (CNs) consist of an extensive collection of nodes, which are usually modelled by dynamical systems, and these nodes are connected according to specific topological structures. As a typical collective behavior, the synchronization of CNs has been investigated extensively due to its wide applications in various scientific fields ranging from biology and engineering to physics and sociology. As a particular type of feedback control, impulsive control uses impulses, which are state abrupt changes or jumps at a sequence of discrete times, to achieve network synchronization. The impulsive control paradigm has proven robust and efficient in network synchronization.

In this talk, we discuss the synchronization problem for a class of CNs with a pinning impulsive control approach. We propose a novel event-triggering algorithm to determine the impulse times and then introduce sufficient conditions on the network topology, impulsive control gains, and parameters in the event-triggering conditions to guarantee network synchronization. Next, we introduce an adaptive tuning method on the network coupling strength to allow arbitrary pinning schemes for the event-triggered impulsive controller. With the adaptive coupling strength, the synchronization of CNs can be realized via the proposed control method with an arbitrary selection of the pinning nodes.