

Four episodes of Kuramoto oscillators



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Abstract: We present the state-of-the-art results on the emergent behaviors of the Kuramoto oscillators. In particular, we discuss relations between the finiteness of collisions and phase-locking of the Kuramoto model. When there is no inertial effect, it is well known that the finiteness of collisions is equivalent to the emergence of phase-locking. Thus, when a Kuramoto ensemble is under the effect of inertia, whether the same equivalence relation hold or not is an intricate question. In this talk, we show that in a small inertia regime, the aforementioned equivalence still holds, whereas in a large inertia regime, we show that a homogeneous Kuramoto ensemble with the same natural frequencies can exhibit phase-locking, while there are countable number of collisions between Kuramoto oscillators. This is a contrasted effect of a large inertia in phase-locking process. This is a joint work with Hangjun Cho (SNU) and Jiu-Gang Dong (Dalian Univ. of Technology).

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