Synchronous singularities of a Kuramoto network

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This talk is a glimpse of singularities and graph theory in the study of networks of coupled dynamical systems. In broad terms, a network is a graph whose vertices represent individual systems (cells) and whose edges represent couplings between those systems. A singularity of a network vector field is expected to be a synchronous pattern. Synchrony, a natural concept in network dynamics, is a partition of the cells into subsets (often called clusters) such that all cells in the same cluster are synchronous. Here we present recent findings of synchronous singularities and their stabilities for the Kuramoto model. Our motivation to study this case relies on its popularity among Physicists, for showing existence of distinct clusters in a network of coupled identical oscillators.