Resonance Phenomenon of Metronome Synchronization

Liu, Xiaoyang (School: No. 2 High School of East China Normal University)

Synchronization is a basic physical phenomenon in the dynamics of coupled nonlinear systems. This project mainly studies the coupling phenomenon in several metronomes, which means that the metronomes are released at different initial phases and will automatically achieve synchronization after a period of time. Two kinds of experimental structures, surface support and suspension, were used in the experiment. During the research, I studied from two metronome and carried on the induction based on the experimental phenomena. Then the frequency, the initial phase of the metronome, quantity, and the relative position of the swing on variables are studied. It was found that the relation between frequency and synchronization time is roughly linearly, and the quantity and initial phase have a great influence on the system's synchronization process. The relative position of swinging plane also affects the path of synchronous motion and status through adjusting the angle. This research could be further extended to the resonance phenomenon caused by irregular vibration system. In the future the theory may be applied to mechanical calibration, strengthening and weakening of waves and so on.

Awards Won: