

Dynamics in Coupled Oscillators with Recurrent/Random Forcing, A PDE Approach

Dedicated to Professor Min Qian on the Occasion of his 75th Birthday

Wenxian Shen *
Department of Mathematics
Auburn University
Auburn University, AL 36849

Abstract. The current paper is devoted to the study of coupled oscillators with recurrent/random forcing. Special attention is given to the solutions having the same recurrence/randomness as that of the forcing (recurrent/random solutions for short). By imbedding coupled oscillators into coupled parabolic equations, it establishes a general theorem on the existence of recurrent/random solutions. It also finds conditions under which such solutions are unique. When the recurrent forcing is actually quasi-periodic or almost periodic, recurrent solutions are referred to as quasi-periodic or almost periodic solutions in a weak sense and they are quasi-periodic or almost periodic in the classical sense under the uniqueness conditions. In addition, applications of the general theory to coupled Duffing type oscillators and Josephson junctions are considered and the results obtained extend several existing ones for quasi-periodic Duffing oscillators.

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