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Response of a suspended cable to narrow-band random excitation with peaked P.S.D.

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Abstract

The response of a suspended cables subjected to narrow-band random excitations with two types of peaked P.S.D. is formulated and analyzed. Banach fixed-point theorem is used for eigenfunction analysis of the differential-integral equations of motion for the first time in this paper. Fredholm approach also is used in the free vibration analysis of the suspended cable and then using Galerkin mode approximation method, power spectral density, and root mean square of the response are computed for two practical types of excitation. All of the calculated results converted to dimensionless quantities make their usage easier in vibration analysis of some practical cases such as vibration of moving track due to ground irregularity and vibration in power transmission lines due to vortex shedding. It is found that at the first crossover, at which repeated frequencies happen for the first two modes, the response of the cable is at lowest level. It is also found that the root mean square of the response of a suspended cable is lower than that of a linear cable. © 2005 Elsevier Ltd. All rights reserved.

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