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Mean Square Responses of a Cantilever Beam with Various Damping Mechanisms

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Abstract : In the present paper, the stationary random vibration of a uniform cantilever beam is investigated. Two types of damping mechanism, i.e. the external and internal viscous dampings, are taken into account simultaneously. The excitation form is the support motion, and it is ideal white. Because two type of damping mechanism are considered concurrently, the product of the modal damping ratio and the natural frequency is not a constant anymore. As a result, the infinite definite integral encountered in the process of computing the mean square response is more complex than that in the existing literature. One signal progress of this work is to have calculated these definite integrals accurately. The precise solution of the mean square response is thus obtained in the infinite series form finally. Numerical examples are supplied and the numerical outcomes acquired confirm the validity of the theoretical analyses.

Keywords : random vibration, cantilever beam, mean square response, white noise
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