RESPONSE OF BEAMS TO CORRELATED RANDOM BASE EXCITATION

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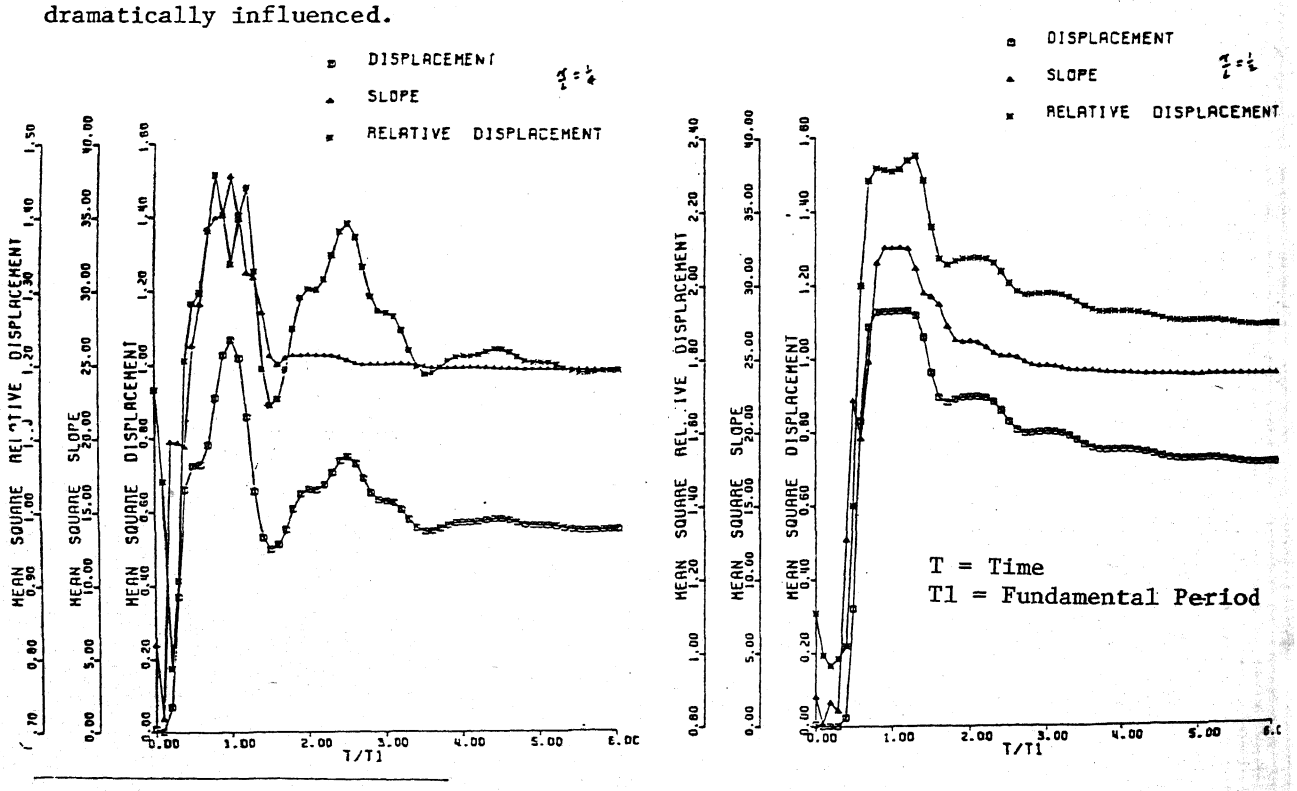
SUMMARY

While the response of beams and plates subjected to random forcing functions has been studied in some detail by several investigators in the past little, if any, work has been done on the response characterization of beams to random boundary excitations. Such excitations typically arise when large structures, such as long span bridges, are subjected to waves that propagate through the earth media, like those created by nuclear blasts, earthquakes, etc. This paper has been motivated by such applications, and uses a general technique for the solution of problems involving boundary excitations, by a reduction of the boundary conditions to a homogenous form.

The method is applied to determine the mean square value of the response of a simply supported damped shear beam. The boundary excitation is characterised by a random input, having an earthquake-like spectrum, which propagates from one support to the other in a finite time, τ_o. The mean square transient response of the beam is evaluated and it is shown that depending on the beam characteristics, the spectral width of the input and the delay time involved in the propagation between supports, the mean square response of the beam can be dramatically influenced.



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