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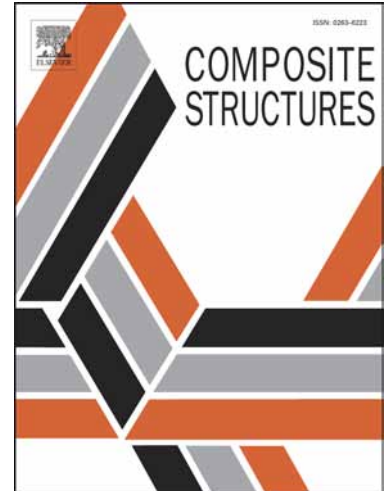
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**Transient response analysis of cross-ply composite laminated rectangular plates  
with general boundary restraints by the method of reverberation ray matrix**

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**Abstract**

The aim of this work is to present a unified and analytical solution for the transient response analysis of moderately thick general cross-ply composite laminated rectangular plates with general boundary restraints by using the method of reverberation ray matrix (MRRM). The wave solutions are constructed by the exact closed form solutions of the governing differential equations on the basis of the first-order shear deformation theory (FSDT). The reverberation ray matrix can be easily obtained by using the MRRM together with the wave solutions, boundary conditions and dual coordinates of the composite plate. As one merit of this paper, the spring boundary technology is applied to imitate the general boundary restraints and eliminate the barrier of the reverberation ray matrix. Then, the early short time transient responses of the composite laminated rectangular plate with general boundary restraints are obtained by using the Fast-Fourier transform (FFT) algorithm. The excellent accuracy, reliability and efficiency of the current solution are fully demonstrated and verified through numerical examples involving plates with different boundary conditions. A variety of new parameter studies for the composite laminated rectangular plate with different elastic restraint parameters, layer numbers, orthotropic ratios as well as various impact load types are

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