ON THE FREE VIBRATIONS OF BEAMS AND ORTHOTROPIC PLATES

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An accurate procedure to determine the free vibrations of beams and plates is presented. The dynamic behavior of the structures under consideration is analyzed by using the theory of the orthotropic plate simply supported on two sides and free on the two others. The plate can be excited by a convoy of moving loads. The determination of the dynamic response requires the knowledge of the natural frequencies and the shape modes of vibrations. The boundary conditions of the differential equations of vibrations lead to a homogeneous system. The determination of the noncommonplace solutions led to a nonlinear problem in Eigen frequencies. Thus, we have developed a computer code for the determination of the eigenvalues. It is based on a method of bisection with interpolation, with the accuracy up to 10^{-12}. Moreover, to determine the corresponding modes, the calculation algorithm developed uses the Gauss method with a partial optimization of the "pivots" combined with an inverse power procedure.

In this paper, we give, some examples of cases studied. The comparison with results presented in the literature is completely satisfactory.

Keys words: beam, orthotropic plate, vibration, natural frequency, bisection method.