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Space-time element method in structural dynamics. (English) Zbl 0723.73078
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Summary: The paper deals with recent developments of the space-time element method in vibration analysis. Discrete methods applied to date in structural dynamics make use of spatial discretization independently of the time integration procedure. It limits applications of such an approach. The full space-time approximation can be considered as an extension of the finite element method over the time domain and it allows to treat spatial variables in the same way as the time variable. Nonstationary discretization, adaptive techniques, directly obtained joint-by-joint procedure are not the only positive features of the space time finite element approach. Although the additional time variable in the shape functions is considered and the resulting element matrices are greater than static stiffness and mass matrices, the cost of the solution algorithm is comparable with other numerical methods. Some testing examples prove the efficiency of the method.

MSC:

74S05 Finite element methods applied to problems in solid mechanics

74H45 Vibrations in dynamical problems in solid mechanics

Keywords:

time integration procedure; Nonstationary discretization; adaptive techniques; joint-by-joint procedure