

Dynamic analysis by a new family of time-marching procedures with adaptive time integration parameters

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ABSTRACT

In this work, a new family of time-marching procedures for dynamics is discussed. The new methodology is based only on displacements/velocities relations, requiring no computation of accelerations. Expressions for the time integration parameters of the method, which adapt according to the properties of the model, are suggested, rendering a very effective technique. In fact, the new procedure provides much more accurate results than standard time-marching techniques, being quite competitive. The main characteristics of the new family are: (i) it is a very simple technique and it can be easily implemented into any existing code; (ii) some well-known and widely used methods can be reproduced by the technique; (iii) it is truly self-starting, requiring no initial procedures at all; (iv) it is second-order accurate; (v) it has controllable period elongation properties; (vi) it has controllable algorithmic dissipation; (vii) it is unconditionally stable when implicit analysis are focused; (viii) it allows explicit analysis to be carried out; (ix) it is efficient and no more than one set of implicit equations needs to be solved at each step. Along the paper, numerical results are presented, illustrating the good performance and high potentialities of the new method.

REFERENCES

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