

RESUMO N° 14

## HIGH-ORDER HERMITIAN ALGORITHM FOR NON-LINEAR DYNAMICS

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The main objective of this paper is the presentation of a more detailed study of an efficient single-step algorithm [1] in solving non-linear structural problems. The proposed algorithm is formulated in terms of two Hermitian finite difference operators of fifth-order local truncation error and it is unconditionally stable with no numerical damping presenting a fourth-order truncation error for period dispersion (global error). In addition, although it is in competition with higher-order algorithms presented in the literature, the computational effort is similar to that of the classical second-order Newmark's method.

As the developed algorithm takes into account the repeated differentiation of the governing equation, additional nonlinear terms are required to solve nonlinear problems. Thus, it is interesting to consider, for example, the classic iterative procedures presented by Argyris and Mlejek [2]. Although the presence of these additional nonlinear terms increases the number of operations in the iterative operations and introduces some numerical noise in comparison to the Padè-P22 algorithm family [3], the reduction obtained in the matrix factorization and higher orders of the relative radii errors are interesting attributes of the proposed algorithm.

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[2] J. Argyris, H. P. Mlejek: *Dynamics of Structures in Texts on Computational Mechanics*. North-Holland, Amsterdam, 1991.

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