11th World Congress on Computational Mechanics (WCCM XI)
5th European Conference on Computational Mechanics (ECCM V)
6th European Conference on Computational Fluid Dynamics (ECFD VI)
July 20 - 25, 2014, Barcelona, Spain

A COMPARISON BETWEEN LINEAR AND NONLINEAR TIME HISTORY ANALYSES AFTER IMPLEMENTING A RECENT COMPUTATIONAL COST REDUCTION TECHNIQUE

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Key Words: *Accuracy. Computational cost, Convergence, Time history analysis, Linear, Nonlinear.*

The true behaviour of structural systems is nonlinear dynamics, and hence, as a consequence of the significant advancements in computational theories and facilities in the last decades, implementing nonlinear dynamic analysis in the study of structural systems behaviours becomes more conventional day by day. Nevertheless, the computational costs are still considerable, and essential to be somehow decreased, while not scarifying the accuracies. This abstract introduces an attempt in this direction. The objective is to study the loss of accuracy and change of computational cost when implementing a recent computational cost reduction technique in practical nonlinear time history analyses, and compare the performance with the corresponding linear analyses. The technique, being based on convergence with second order of accuracy, replaces the record of the external forces with records digitized at larger steps and accordingly provides the possibility of time integration with large steps. Many tests are carried out on the performance of the technique, from which, the performance sounds better in linear analyses. In this paper, some structural systems will be selected with designs and analyses parameters set with attention to the existing conventions and practice, and the time history analyses will be carried out for corresponding linear and nonlinear practical cases, once, while implementing the technique and once while not implementing the technique, considering different time integration methods. The results will be compared and

discussed from the point of view of accuracy and computational cost. Though the study is not finalized yet, the final consequence would likely be the good performance of the technique in both linear and nonlinear practical analyses, and meanwhile, the superiority of the performance in linear analyses.

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