

On the performance of a transient analysis computational cost reduction technique when the analysis is involved in friction

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ABSTRACT

Time integration is the most versatile tool for transient analysis broadly accepted especially for nonlinear dynamic analysis. However, inaccuracies exist in the obtained responses and the analyses are expensive because of the step-by-step nature of time integration. Concentrating on the computational cost, the issue is even more complicated when the excitation is available as a digitized record, e.g. digitized records of earthquake acceleration. To reduce the additional cost that may be imposed to the analysis because of the smallness of the excitation digitization step, a technique is proposed in 2008. The technique has been implemented in many analyses leading to considerable reduction of computational cost with negligible effect on accuracy. Recently, it is displayed that the performance of the technique in analyses involved in geometrical nonlinearity can be as successful as the performance of the technique in linear analyses. Considering this and the fact that the technique has never been implemented in analyses involved in friction, the objective in the paper is to study and evaluate the performance of the computational cost reduction technique proposed in 2008 in analyses involved in simple friction. The consequence is the good performance of the technique for many problems and the dependence of the performance on the parameters of nonlinearity analysis, e.g. nonlinearity tolerance. (The study is in progress.)

Keywords: time integration, digitized excitation, friction, computational cost

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