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A TECHNIQUE FOR MORE EFFICIENT TIME INTEGRATION APPLIED TO SEISMIC ANALYSIS OF POWER SUBSTATION EQUIPMENTS

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Abstract. The true behavior of structural systems is dynamic that in many cases can not be simplified to static. For analyzing the structural dynamic behaviors, time integration is the most versatile tool, and, hence, under special attention in the analyses of structural systems, becoming more complicated everyday. Nevertheless, the responses of time integration are generally being obtained after considerable computational cost and are inexact. In the last decades, many attempts are carried out for time integration with less computational cost and acceptable accuracy. Considering the digitized nature of ground strong motion records, a technique for considerably reducing the computational costs with small loss of accuracies is recently proposed. Being based on the notion of convergence and its role in time integration analyses, the technique replaces seismic records with excitations, digitized at larger steps. The good performance of the technique is displayed via simple linear and nonlinear examples. In view of the devastating effects of power substation equipments in the past earthquakes, the objective, in this paper, is to examine whether we can successfully implement the technique in time integration of real power substation equipments. The technique is reviewed with special attention to its implementation in seismic analyses of power substation equipments, once ordinarily and then again after implementing the proposed technique. The achievements evidence the good performance of the technique and leads to approaches for more comprehensive researches.