

EFFECT OF VARIATION OF THE SYSTEMIC PARAMETERS ON THE STRUCTURAL
RESPONSE OF SINGLE DEGREE OF FREEDOM SYSTEMS SUBJECTED TO
INCREMENTAL DYNAMIC ANALYSIS

by

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(ABSTRACT)

This thesis presents the results of a study of the effect of variations of systemic parameters on the structural response of single degree of freedom systems subjected to Incremental Dynamic Analysis. The systemic parameters are mass, stiffness, damping, yield strength and geometric stiffness. Each of these parameters was varied one at a time while the other values were kept constant. For each variation of parameters a set of single-record IDA curves was obtained. Five to six ground motions were used for this study to generate the single-record IDA curves. These ground motions were scaled prior to their application on the structure. The scaling factor was based on the spectral acceleration at the fundamental frequency of the structure at 5% of critical damping. The scale factor is affected if the system parameters are changed. An important issue for this study was whether to persist with scaling corresponding to the median value from the range of the values of the parameter or to update the scaling according to the system. Based on some tests using both methods, the median scaling approach was found to be more suitable. The IDA curves for variation of parameters were then investigated to identify any trends that may help in qualitatively predicting the response of a system relative to another system. The response was measured by the peak displacement and the maximum base shear of the system. A clear trend was identified when the damping or the yield strength was varied. However, no definite trend was observed when the material stiffness or the geometric stiffness of the system was varied.

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