

CONTRIBUTIONS TO THE SEISMIC ANALYSIS OF FRAME STRUCTURES

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ABSTRACT

The paper deals with a new and simple method concerning the calculation of relative rigidities between two successive floors in frame structures. A method for the direct calculation of the fundamental vibration period, seismic forces, bending moment diagrams and lateral displacements is also described. An example of numerical calculation confirms the advantages and the accuracy of the new method.

FRAME REDUCED TO APPROXIMATELY EQUIVALENT SHEAR BUILDING

The approximate interstorey stiffness is given by a simple formula based upon the distribution factors of the column ends at that storey. The derivation of a storey stiffness is based on a physical model which is made simple by removing all unimportant degrees of freedom.

FUNDAMENTAL PERIOD

From the interstorey stiffnesses the static deflection profile may be calculated and hence, by Rayleigh's method, an approximation to fundamental period is obtained. When compared with detailed analysis the interstorey stiffness and the natural period are found to be within 5%.

SEISMIC FORCES AND MOVEMENTS

The seismic shears and displacements are given in terms of the approximate interstorey stiffnesses.

A formula is given for calculating the moment at the ends of each member of the frame.

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