Computation of Fundamental Periods for Moment Frames Using a Hand-Calculated Approach

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ABSTRACT

The second method (known as Method B), specified in the 1997 Uniform Building Code Static Force Procedure, is a rational and accurate approach for finding the fundamental period of a frame. The formula used in Method B, however, is not a popular formula because it involves time-consuming computations of frame deflections which usually require the use of computer software. A hand-calculated approach for the computation of frame deflections using a calculator rather than a computer is suggested in this paper in order to turn Method B into a practical method for determining the fundamental periods of low-rise moment frames. The general stiffness matrix of a three-story, three-bay frame presented in this paper is intended to be used as an aid to compute the deflections for any moment frame within three stories in height and within three bays in width. Examples shown in this paper illustrate the step by step procedure for the computation of the fundamental periods of low-rise moment frames using the proposed hand-calculated approach. These examples also demonstrate that the results obtained from the proposed hand-calculated static approach agree with that obtained from the dynamic analysis.