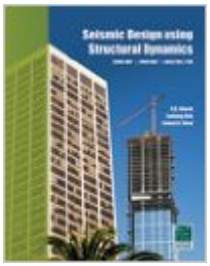
Seismic Design Using Structural Dynamics (2006 IBC, 2009 IBC, ASCE/SEI 7-05)



Synopsis

Description: The 2006 and the 2009 editions of the International Building Code (IBC) require the use of a dynamic analysis procedure for the seismic design of a building under certain conditions of irregularity, occupancy, and height. However, dynamic analysis procedures are more complicated than the more traditional static procedure, and over the years, many questions have been asked about code provisions concerning this. This publication has been created to answer these questions and demystify the application of the code. This publication addresses the two methods by which a designer may comply with the seismic design requirements of the 2006/2009 IBC: Equivalent Lateral Force Procedure (ASCE 7-05 Section 12.8) and Dynamic Analysis Procedure (ASCE 7-05 Section 12.9 and Chapter 16). Although ASCE 7-05 (the 2006 and the 2009 IBC) formally recognizes two dynamic analysis procedures: modal response spectrum analysis and time-history analysis, the modal response spectrum analysis is by far the more common in design office usage and is the primary subject of this publication. The background and details are explained in Chapter 1 of this publication where a step-by-step analysis procedure is given, and a three-story, one-bay frame example is solved entirely manually to illustrate application of the procedure. Chapter 2 of this publication is devoted exclusively to the detailed design of a 20-story reinforced concrete building that utilizes a dual shear wall-frame interactive system for earthquake resistance. Modal response spectrum analysis is used as the basis of design. Design utilizing the Equivalent Lateral Force Procedure is also illustrated as a prerequisite to design using the Dynamic Analysis Procedure. A key feature of this example that would be of particular interest to users is the design of reinforced concrete shear walls by the procedure in the 2005 and 2008 editions of ACI 318 Building Code Requirements for Structural Concrete.

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