

Abstract for 2009 Structures Congress

Session: The Direct Analysis Method – Recent Developments and Applications

Title: Interface of the Direct Analysis Method and Seismic Design

Authors: Taichiro Okazaki, Ph.D., A.M.ASCE (# 456935)  
Assistant Professor, Department of Civil Engineering  
University of Minnesota  
  
Civil Engineering Building,  
500 Pillsbury Drive SE, Minneapolis, MN 55455  
Phone: (612) 612-0331  
Fax: (612) 612-7750  
Email: tokazaki@umn.edu

Larry A. Fahnestock, Ph.D., P.E., M.ASCE  
Assistant Professor, Department of Civil and Environmental Engineering  
University of Illinois at Urbana-Champaign  
  
2108 Newmark Civil Engineering Laboratory,  
205 North Mathews Avenue, Urbana, IL 61801  
Phone: (217) 265-0211  
Fax: (217) 265-8040  
Email: fhnstck@uiuc.edu

Abstract: The *Direct Analysis Method* (DM) is a new procedure to address stability requirements in steel framing systems. Because the DM has important benefits over conventional methods, it is expected that the DM will replace the conventional methods as the standard method for stability analysis and design. However, currently, the interface of the DM and seismic design requirements is not well established. Stability is an important design consideration both in the absence of earthquake loads when the system ductility demand at the ultimate strength level is minimal, and in the presence of earthquake loads when the design premise is to permit controlled inelastic deformation in the system and provide large ductility capacity. Nonetheless, previous studies of the DM have not examined in depth how the DM could address seismic effects.

Therefore, the Technical Committee on Methods of Design (TAC Metals) initiated a study to investigate the interface of the DM and seismic design requirements, as the first step effort to expand the application and benefits of the DM to seismic design. The objectives of the study are: (1) To clarify how the DM addresses seismic effects; (2) To evaluate how the DM including plastic analysis, termed “direct elastic-plastic hinge analysis,” addresses seismic effects; and (3)

To identify research needs related to the interface of the DM and seismic design requirements. This paper will describe findings from the study and design implications.

Comments: The paper participates in a proposed session titled “The Direct Analysis Method – Recent Developments and Applications” which is endorsed by the ASCE/SEI Technical Committee on Methods of Design (TAC Metals)