Title Design of Transfer Girder Systems for Seismic Effects in Tall Building

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Abstract

In order to enable large openings, wide spaces and make the access comfortable to public lobby area, components like shear wall, frame elements are discontinued at particular level; generally in tall buildings Transfer girders are mostly used to achieve this in different levels of the structure to transfer heavy gravity loads to a widely spaced column. Gravity loads are the major consideration of the design of this type of deep Girder, but consideration of seismic forces in also an integral part of the design to make it seismic resistant. Transfer girder often modeled by conventional frame element method or strut and tie method are mostly considered to remain elastic. Whereas in seismic resistant design of transfer girder in tall buildings nonlinearity or hinging is expected, suitability of strut-tie model in cyclic response is investigated.

In this research analysis, emphasizes on nonlinearity issues of transfer girder systems in tall buildings where gravity load acts with seismic loadings in various approaches of design methods; conventional frame element method, strut and tie method, and newly developed direct non-linearity in layered Shell element. Considering shear behavior both shear wall and Deep girder are comparable, in order to verify these design approaches Shear wall laboratory testing cyclic loading hysteresis curves is chosen for investigation. AP2000 models are used for design simulation and analysis. The verified approaches are used in Tall building transfer girder frame to investigate the effects of design. Relevant issues in real structure is conducted with appropriate seven ground motions by these approaches of transfer girder design and its effects is discussed, in linear and nonlinear behavior as well to estimate the capacity of the structures

Keywords RC Shear Walls; Transfer Girder (Deep Beam); Conventional method; Non-Linear Layered Shell Element Method; Strut-Tie Method; Cyclic Loading; Nonlinear direct integration time history analysis..