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In view of the contents of Section 3 of the general report by Professors O. Steinhardt and H. Beer, the two papers (1) and (2) by Ryo Tanabashi and Tsuneyoshi Nakamura should also be referred to as a possible approach to the plastic design of tall multi-story frames. In Ref. (1), the linear minimum weight design of a broad class of tall multi-story frames of practical interest has been established in a simple and explicit analytical form by introducing a new concept of "frame moment". The general solution for comparatively large lateral forces has been obtained due to the particular circumstance in Japan where equivalent static lateral forces due to earthquake disturbances are comparatively larger than those in other countries. The solution may, however, be readily modified for a more general case where the vertical forces are dominant compared to lateral forces in several stories from the top. This design is regarded as the preliminary design.

When a rigid-plastic preliminary design is constructed for a design problem, one may readily find the axial force distribution corresponding to the bending moment distribution at the collapse state of the simple plastic theory. Hence the secondary design may be accomplished by assigning the plastic moment to a column in such a way that the known axial force and bending moment acting upon its end sections would not violate the corresponding bending moment-axial force-interaction yield conditions.

The last step is to modify the above secondary design against the unfavorable effect of the additional moments induced by the sidesway deflections under large axial forces in the last hinge point state. It should be noted that the last hinge point load factor must be equal to or less than the true failure load factor and may be used as the base of the design. The last hinge point state may be constructed iteratively starting from the above secondary design. The crucial point here is that the iterative process is to be carried out not with respect to the moments as an analysis but with respect to the cross-sectional dimensions as a design problem. An example of a 30-story frame treated in Ref. (2) has shown a rapid convergence of the present procedure.

This last hinge point design is regarded as a standard design for the problem with which any actual design may be compared. Since any augmentation in stiffnesses and plastic strengths would not decrease the elastic critical load factor and the rigid-plastic collapse load factor, any actual design may be accomplished in reference to this standard design by appropriate augmentations such that the actual design is guaranteed to possess a greater failure load factor than the last hinge point load factor of the standard design satisfying other various practical requirements.

(1) Ryo Tanabashi and Tsuneyoshi Nakamura, "The Minimum Weight Design of a Class of Tall Multi-story Frames Subjected to Large Lateral Forces", Proc. 15th Japan National Congress for Appl. Mech., pp 72-81, 1965.

(2) Ryo Tanabashi and Tsuneyoshi Nakamura, "An Approach to the Last Hinge Point Design of Tall Multi-story Frames", Proc. Symposium on the External Forces and Structural Design of High-rise and Long-span Structures, pp 169-179, Tokyo, Sept. 1965. (Japan Society for the Promotion of Science)