

Optimum Design of Tall Tube-Type Building: An Approach to Structural Height Premium

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Abstract : In last decades, tubular systems employed for tall buildings were efficient structural systems. However, increasing the height of a building leads to an increase in structural material corresponding to the loads imposed by lateral loads. Based on this approach, new structural systems are emerging to provide strength and stiffness with the minimum premium for height. In this research, selected tube-type structural systems such as framed tubes, braced tubes, diagrids and hexagrid systems were applied as a single tube, tubular structures combined with braced core and outrigger trusses on a set of 48, 72, and 96-story, respectively, to improve integrated structural systems. This paper investigated structural material consumption by model structures focusing on the premium for height. Compared analytical results indicated that as the height of the building increased, combination of the structural systems caused the framed tube, hexagrid and braced tube system to pay fewer premiums to material tonnage while in diagrid system, combining the structural system reduced insignificantly the steel material consumption.

Keywords : braced tube, diagrid, framed tube, hexagrid

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