Computational Method to Control Wind-Induced Vibration of Tall Buildings using Resizing Algorithm

Ji Hyun Seo [1], Jin Hyeok Lee[2], Hang Choi[3], Hyo Seon Park[4]

Abstract: As buildings become taller and slenderer, serviceability design criteria such as maximum lateral drift and wind-induced vibration level play a greater role in structural design of high-rise buildings subjected to lateral wind loads. Especially, wind-induced vibration is directly related to discomfort of building occupants. However, no practical computation model or design method is available for structural designers to control the wind-induced acceleration. This paper presented a computational model to control wind-induced vibration of tall buildings using the resizing algorithm. The level of wind-induced vibration is calculated by the well known estimation rules of SAA 83, Solari method NBCC 95, ASCE 7-02, and ISO 6897. Based on the fact that the level of wind-induced vibration is inversely proportional to the magnitude of natural frequency of buildings, natural frequencies of tall building are modified by redistributing of structural weight according to the resizing algorithm in the proposed model. The model is applied to wind-induced acceleration control of the 42-story residential building.

CD Database subject headings: Resizing algorithm, Tall buildings, Structural optimization, Wind-induced vibration, Drift design

[1] PhD, Post Doc., Department of Architectural Engineering, Univ. of Yonsei, 134 Shinchon-dong, Seoul 120-749, Korea.

2. Researcher, Construction Technology Institute, GS Engineering & Construction

3. Principal researcher, Construction Technology Institute, GS Engineering & Construction

4. Professor, Department of Architectural Engineering, Yonsei University, Seoul, Korea: communicating author