# Practical Application of Mass Type Damper for Wind-Induced Vibration Control of Super-Tall Buildings

**Sanghyun LEE**
Associate Professor
Dankook University
Yongin-si,Gyeonggi-do,
Korea
*Lshyun00@dankook.ac.kr*

**Lan CHUNG**
Professor
Dankook University
Yongin-si,Gyeonggi-do,
Korea
*lanchung@dku.edu*

**Yunseok KIM**
CEO
TE Solution
Anseong-si, Gyeonggi-do,
Korea
*yskim@tesolution.com*

**Sungsik WOO**
**Postdoctoral Researcher**
Dankook University
Yongin-si,Gyeonggi-do,
Korea
*Lshyun00@dankook.ac.kr*

## Summary

In this paper, a mass damper was proposed and the plan on its practical application for wind-induced vibration control of a super-tall building was introduced. The damper was developed to generate forces which were calculated by both linear and nonlinear control algorithms. A controller in which the control algorithms were embedded was developed and it was verified through experiments that the damper with the controller could show dynamic behavior as a designer had intended. A preliminary design of a super-tall building with the damper was conducted. As a nonlinear algorithm, decentralized control algorithm which only requires to measure damper-installed floor response in order to calculate the control force was proposed. Simulation results indicated that the proposed damper could provide better or at least equivalent control performance than the usual active/hybrid type damper controlled just by existing linear control algorithms.

**Keywords:**Super-Tall Buildings, Wind-Induced Vibration Control, Mass Type Damper, Control Algorithm.

## 1. Introduction

Many researches to improve buildings' windresistance have been conducted extensively in theworld. The current trend shows that the researches areexiting the passive measures to increase a buildingstructure's rigidness or ductility, and actively focus ondissipating external wind forces by applying variousvibration control technologies on building structures.During last thirty years, energy dissipation devices invarious types have been adapted to more than sevenhundred buildings in many countries including the U.S.,Japan, New Zealand, Italy, Canada and China as newmeasures for engineerings and reinforcements of theseismic/wind resistance. Also, energy dissipation devicesare confirmed to be effective to improve the usefulnessand safety of structures exposed to dynamic loads.

In the U.S. and Japan, the vibration controltechnology is actively utilized creating a brand newmarket for building structure seismic/Wind resistanceimprovement while the laws and regulations areestablished with the vibration control engineeringtechnology to the construction standard (code) includedto utilize the technology for building structures. Thevibration control technology market is expanded, not inthe design level, but, the construction level due to thepurpose of the wind-induced vibration control. Theinterpretation and engineering technologies regarding thestructure vibration control are improved having the U.S.and Japan at the center. Many

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