Viscoelastic Coupling Dampers (VCDs) for Enhanced Performance of Tall Slender Buildings

Speakers:

Constantin Christopoulos, P.Eng., Ph.D.

Professor, Department of Civil Engineering, University of Toronto

Chief Technical Officer, Kinetica, Toronto

c.christopoulos@utoronto.ca

Tibor Kokai, P.Eng., Ph.D.

Principal, Read Jones Christofferssen, Toronto

tkokai@rjc.ca

Outline:

A novel damping system, the viscoelastic Coupling Damper (VCD), has been developed to enhance both the wind and seismic performance of high-rise buildings by adding high damping elements in place of reinforced concrete coupling elements. The VCDs replace structural members, such as outriggers or coupling beams, and therefore do not occupy any usable architectural space. The VCDs provide added viscous damping to all lateral modes of vibration, which mitigates building tenant vibration perception problems and reduces both the wind and earthquake response of tall buildings.

The authors will discuss the development of the technology, full-scale testing and validation of the VCD, and the design of tall buildings for both earthquake and wind loading, including the design of an extremely slender building in downtown Toronto. In this design, the VCD system provided a number of performance benefits including reduced loads, drifts, lateral accelerations and torsional velocities without occupying any architectural space.

About the Speakers:

Constantin Christopoulos, P.Eng., Ph.D. - Dr. Constantin Christopoulos is a Professor of Civil Engineering, the Director of Structures Laboratories at the University of Toronto and the Chief Technical Officer of Kinetica. He is also the holder of the Canada Research Chair in Seismic Resilience of Infrastructure. His current research focuses on the development of new high-performance damping devices for seismic and wind protection. He is the author of more than 100 technical papers, of two major textbooks, and has been involved in a number of high-profile international consulting projects involving the implementation of seismic isolation and supplemental damping devices in structures.

Tibor Kokai, P.Eng., Ph.D. - Dr. Kokai is a Principal with Read Jones Christoffersen Ltd. and specializes in the design of tall buildings in the residential and commercial sector. Tibor's areas of expertise include: reinforced and post-tensioned concrete design, finite element analysis, advanced structural steel building systems, seismic and dynamic analysis. Tibor is a member of the Canadian Standards Association A23.3 Design of Concrete Structures code committee, the Standing Committee on Earthquake Design of the National Research Council of Canada, and was a key member of the team that developed the viscoelastic coupling damper system.