

Behavior of membrane structures subjected to dynamic seismic and wind forces

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Abstract

Membrane structures are frequently used as structural systems because they are built with very light materials, which is convenient for economical and practical reasons. These structures are designed to withstand tensile membrane stresses only; consequently, adequate finite element formulations are required.

Despite the many advances in scientific knowledge regarding this topic, a comparative analysis between earthquake and wind forces behavior for tensile structures is not available.

In this study, two different structures are investigated. A hyperbolic-parabolic structure as well as a conic structure. Both are subjected to a seismic record ground acceleration and are analyzed dynamically. Also, a coupled fluid-structure interaction scheme is used to solve both structures when subjected to wind forces.

The dynamic seismic and wind responses are compared, by discussing on membrane displacements and stresses, as well as on cable forces and support reaction forces.

References

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