

A study on relation between reduced strength and aerodynamic force for inelastic wind design

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ABSTRACT

Inelastic wind design recently received more acceptance among engineers and newly published prestandard by ASCE for performance-based wind design (PBWD) of tall buildings (ASCE, 2019) is an emphasis on this increasing acceptance. In this alternative approach, resonant component of wind load is reduced by permitting inelastic deformation based on yield strength and ductility of the structure. In the study by Gani and Légeron (2012), relation between ductility demand and reduced strength under extreme wind load was investigated.

In this study, the relation between ductility demand and reduced yield strength was examined under different ratios of yield strength and peak aerodynamic force. The results indicated that it may be necessary to keep reduced yield strength larger than aerodynamic force to have reliable inelastic behavior. Results showed that systems with zero or small post-yield stiffness must have yield strength greater than aerodynamic force to avoid damage accumulation and maintain ductility demand in practical range. Though the observed level of damage accumulation was much smaller for systems with large post-yield stiffness, it would be rational to consider the same limit for these systems to minimize damage accumulation.

REFERENCES

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