

Progress on Studies of Structural Inelastic Dynamic Response Using Force Analogy Method

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Abstract

The force analogy method (FAM) is proposed to analyze the inelastic dynamic response of structures in the case of various structural characteristics and earthquake excitations, which uses a change in displacement field to represent the inelastic behavior of structures instead of the traditional method of changing stiffness, see Wong and Yang (1999).

By adopting the FAM and considering energy as the response parameters in evaluating the performance of structures, the energy equations and transfer among various energy forms over the duration of an earthquake have been assessed; see Wong and Yang (2002). As control systems being adopted in structures increasingly, combining the FAM with control algorithms, practical problems like time delay are went deeply into. The predictive optimal control of inelastic structures is also explored by comparison of structures with and without control devices; see Pang and Wong (2006). Moreover, the stochastic dynamic analysis of inelastic structures is studied by using the FAM to simplify and optimize the process; see Wang and Wong (2007). To confirm the FAM used in inelastic dynamic analysis, variety of numerical simulations are made and compared with traditional Finite Element Method adopting structural calculations software existed.

According to the limitations of seismic codes and influences of working conditions (i.e. sites, earthquake excitations, etc), combining FAM with the use of dissipation devices in control systems, further researches are needed on controlled structures and performance-based design, which is of great significance on integrity, high efficiency and feasibility for FAM.

References

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