

Progressive Structural Capacity Loss Assessment

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Abstract : During the service life, a structure may experience extreme loading conditions. The current study proposes a new methodology that covers the effect of uncertainty involved in gravity loadings on key structural elements of new and complex structures by emphasizing on a very realistic assumption that allows the 'Performance-Based Assessment' to be executed on the structure against the gravity loadings. The methodology does not require the complete removal of an element, instead, it permits the incremental reduction in the capacity of key structural elements and preserves the same stiffness of the member in each case of capacity loss. To demonstrate the application of the proposed methodology, a 13 story complex structure is selected that comprises of a diverse structural configuration. The results ensure the structural integrity against the applied gravity loadings, as well as the effectiveness of the proposed methodology.

Keywords : force-deformation relationship, gravity loading, incremental capacity reduction, multi-linear plastic link element, SAP2000, stiffness

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