# Earthquake Response Evaluation Methods for Buildings Utilizing Pushover Analysis

KURAMOTO Hiroshi, Professor, Osaka University

This paper described studies aimed at improving the capacity spectrum method used for the Calculation of Response and Limit Strength, which is a seismic performance evaluation method for buildings introduced into the Building Standard Law of Japan in 2000. Two methods of reducing from a multi-story building to the equivalent single degree of freedom system were proposed to evaluate the maximum earthquake response of the building. One is a nonlinear modal adaptive pushover analysis method, which uses a stiffness-dependent lateral force distribution at each loading step without the eigenvalue analysis, and the other is a method using modal decomposition procedure together with earthquake response analysis. Based on the latter method, an evaluation method of the higher mode responses in the story shear and interstory drift was also proposed. The validity and accuracy of the proposed methods were clarified through the comparisons between predicted results by the methods and analytical results by the time history earthquake response analyses for not only pure frame buildings but also irregular-shaped buildings consisting of mixed soft and rigid stories, wall-frame buildings, multi-story buildings with dampers and asymmetric buildings.