

A design approach for improving structural survivability of buildings under large earthquake forces

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Design is an area over which the engineer has the most control, both technically and financially, in creating structures which can withstand destructive forces of earthquakes. The most widely applied philosophy is to design for earthquake-resistant structures with the idea that stronger and stronger building materials are needed to resist larger and larger forces from earthquakes. This approach may be adequate when designing for protection against small earthquakes, but has serious shortcomings when designing for large earthquakes, as is evident from many after-earthquake scenes. In this presentation, a force management approach is illustrated where the emphasis is on management of the earthquake forces. The concepts of stress concentration, dispersement and re-direction, and the shape of the structure, play a significant role in this approach. Using numerical modelling results and field data, it is shown that the shape of buildings can be designed to disperse the earthquake forces on impact, minimizing the stress concentration in the buildings and greatly improving the overall safety.