

## FOREWORD

The devastating Kobe earthquake of 1995, which left about 5,500 dead and more than 300,000 survivors homeless, also left many problems for civil engineers and researchers. "The shake due to the Kobe earthquake really exceeded our expectation". Since the days shortly after the quake, public officials of the authorities concerned, engineers and academics have been saying this in chorus. The media, however, sometimes gave criticisms on those reciting this set-phrase even though the phrase did hit the mark. This phrase may have sounded to them like a contradictory remark, in contrast with the way of remarking damage before Kobe. In 1984 West-Nagano earthquake for example, a rockfill dam, with the source-site distance of only 5 km, suffered minor damage like longitudinal cracks and slight settlement of the embankment, even though the peak acceleration of 0.4 g seems to have been reached. This event was followed by the remarks to the effect that "The shake due to this earthquake really exceeded the one assumed in the design process. The event, however, has proved that this kind of structure is highly earthquake-proof".

One of the points we have to bear in mind regarding this controversy will be the fact that most design methods like the pseudo static analysis provide indices of stability but no information of possible failure extent, which affects the actual serviceability of a damaged structure. As far as a design process is concerned, it is no wonder that more attention is paid on keeping a structure back from being fatally destroyed by a strong shake assumed, rather than estimating the possible worst failure extent that could happen. However, what we saw at Kobe is urging us to discuss and rethink many problems and measures beyond the conventional design concept.

Many quake-related problems have been discussed intensively, since the days of confusion, and a great deal of possible effort and actions have been taken so far. As the consequence, no small amount of money has been and will be spent on reinforcing structures and accelerating the relevant researches. However, we might face, as the public concern cools down, the difficulty in continuing this intensive effort. We must try to reason as many concerned people as possible into discussing continuously the necessary actions and far-sighted policy we should take. The members of ERS are keenly realizing the importance of our mission.



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