

Fault displacement at the surface and beneath

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Engineering seismology on critical facilities such as nuclear power plants has concentrated mostly on ground shaking from earthquakes. The advancement of strong ground motion studies since 1990s together with our learning from several unexpectedly strong ground shaking events, now we are able to design structures based on deterministic and probabilistic hazard assessments. On the other hand, large earthquakes also damage subsurface and surface structure by displacements on fault planes and associated deformations. For example, a coseismic fault displacement of a railroad tunnel was first observed in Japan in 1930. An early example of consideration on tunnel displacement was conducted for Hayward fault, California in 1960s. Youngs (2003) first applied probabilistic hazard assessment on fault displacement as a part of Yucca Mountain nuclear waste repository project. In recent years, after 2011 Fukushima Dai-ichi Nuclear Power accident, fault displacements were first taken as serious threats for nuclear facilities in Japan. At the same time, international efforts on fault displacement hazard assessment were initiated, for example by IAEA. In Japan, the Atomic Energy Society of Japan published "Development Risk Evaluation Methods and Measures for Fault Movement by Engineering Approach" in 2017 and started preparation of standards concerning probabilistic risk assessment of fault displacement. Recent advancements and achievements on the fault displacement issue will be introduced.