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INFLUENCE OF BASE-ISOLATION ON THE SEISMIC RESPONSES OF NUCLEAR POWER PLANTS

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ABSTRACT

The technology of isolating can improve the reliability and safety of the nuclear power plant through realizing the decoupling between equipment pipelines and components. It also can deal with uncertain factors in the seismic design, and provide solutions for constructing nuclear power plants in high seismic intensity areas. This paper is about the seismic response analysis of a nuclear island building of a 1000 MWe PWR nuclear power plant in which isolation technique on raft foundation is applied. SAP2000 software was applied to conduct seismic response analysis of nuclear island building models with and without base-isolation technique under the ultimate safety ground motion with SAP2000 software. The results were compared with those obtained from the hybrid simulation tests. And the reliability of the calculation was verified. Based on this, the effects of different seismic isolation bearing arrangements to the seismic response of base isolated nuclear island building were analysed. The variation of natural frequencies, story displacements, story accelerations, inter-story shear and ant overturning ability were studied.

Results show that all the five dynamic response parameters above were changed with the arrangement of seismic isolator bearings. Seismic reactions of Nuclear Power Plants with base-isolation decreased obviously if seismic isolation bearing arrangement was reasonable, so as to achieve better seismic isolation effects.

The conclusions in this paper can provide some references and guidance for the application of base isolation technology in engineering practice.