Seismic Analysis of Base-isolated NPP Structures under ISSC-EBP Program

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This paper presents seismic analysis results for the base-isolated NPP structure of APR1400 (Advanced Power Reactor 1400MWe) through the participation in the ISSC-EBP international benchmark program (hybrid simulation to assess performance of seismic isolation in nuclear power plants). The benchmark program provides finite element models including geometry, material properties, characteristics of the base isolators, and input ground motions. The RG (USNRC Regulatory Guide) 1.60 and EUR (European Utility Requirements) (for hard soil) response spectra are used to generate the ground motions, for PGAs (peak ground accelerations) of 0.5g and 0.835g (1.67 times 0.5g), respectively. In this study, the seismic analyses for 26 cases are carried out. In order to estimate the efficiency of seismic isolation systems, the seismic response of the isolated NPP structure is compared with that of the non-isolated NPP structure. The comparison shows that the former is significantly reduced compared to the latter. Finally, the seismic analysis results are compared with the hybrid simulation test results.