Transactions, SMiRT-24
BEXCO, Busan, Korea - August 20-25, 2017
Special Session for IAEA EESS WA2.3
(Hybrid Simulation to Assess Performance of Seismic Isolation in NPPs)

SIDRS-BASED NONLINEAR SSI ANALYSIS TECHNIQUES CONSIDERING ROCKING OF RIGID BASEMAT (A STUDY FOR PUBLISHING KOREAN CODE ON SEISMICALLY ISOLATIED STRUCTURES)

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ABSTRACT

The ASCE 4-16 (2017) came up with a multistep nonlinear soil-structure interaction (NLSSI) analysis procedure based on seismic isolation design response spectrum (SIDRS) in a way that can take into account the effect of the soil-structure interaction as well as nonlinear behavior of isolation devices. The ASCE 4-16 requires that the rocking of the basemat shall be considered in the SIDRS analysis when its effect is significant in the SSI analysis. However, the ASCE 4-16 does not present any analytical method for considering the rocking. This paper addresses the issue to offer a couple of SIDRS methods to consider the rocking of basemat in the NLSSI analysis of base-isolated structures with rigid basemat, as follows: (I) Addition of rocking soil spring element to the center of the rigid basemat subjected to horizontal motion, and (II) Consideration of rocking input motion fully coupled with the horizontal input motion at the basemat. Then, we performed the NLSSI analysis of a seismic isolation NPP structure using the proposed method as well as a refined NLSSI technique. Numerical results indicated that the proposed method is effectively applicable to the SIDRS-based NLSSI analysis of seismically isolated NPP structures with rigid basemat.