

THE UPDATE OF PROBABILISTIC FLOOR RESPONSE SPECTRA FOR SEISMIC PROBABILISTIC SAFETY ASSESSMENT OF LOVIISA PLANT

* PENTTI VARPASUO ¹,

¹ Fortum Nuclear Services Ltd.
00048 Fortum, Finland
pentti.varpasuo@fortum.com

Key Words: *Floor spectra, Probabilistic structural response, Latin hypercube method, seismic excitation*

ABSTRACT

During the recent years the seismic risk analysis has obtained steadily increasing attention. It has been observed that the seismic loading has simultaneous damage potential to several redundant components and systems of a nuclear power plant. The seismic risk analyses have demonstrated that the contribution of seismic risk to the core damage or to the risk of the release to environment can be significant. In order to calculate the seismic fragilities of the plant equipment, it is necessary to obtain probabilistic seismic responses of structures which support this equipment. The breadth and depth of the response analysis depend on the information existing on analyses performed during the design stage and on the method used to develop component fragilities. In this study the update of probabilistic seismic response calculations was carried out for the most important structures of the Loviisa nuclear power plant.

The purpose of probabilistic floor response spectra generating is an explicit treatment of uncertainties in various phases of the analysis procedure. The specific examples of these phases are the specification of the free-field ground motion and the development of structural model. This approach will provide a complete description of the seismic environment for equipment and piping mounted in the structures and can be used directly in the seismic probabilistic safety assessment. For selected nodal points in the structures, the response spectra will be provided as 50th percentile and 84th percentile amplified spectra. In seismic probabilistic risk assessment, the uncertainty in structural response is required and this is defined by the 50th and 84th percentile response spectra.