

# MODELING VVER-1200 REACTOR PRESSURE VESSEL BY USING COMPUTATIONAL FLUID DYNAMICS TOOLS

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## ABSTRACT

In this study, the Reactor Pressure Vessel (RPV) of the VVER-1200 (AES-2006) was modeled and thermal-hydraulic behavior of coolant in the RPV was investigated. The model set for the study includes 3 dimensional geometry description of the RPV. While the geometry is defined, the console elements (which help keeping RPV in its original position) are ignored since they are small and their effects on thermal or hydraulic behavior on the flow is negligible. The outer sections of the RPV were modeled in detail. For the modeling of inner sections, many of the core supporting structures locating at the lower plenum are modeled almost as exactly as they are. For the parts and components that are not modeled in detail and are simplified, porous media approach was adopted in order to perform realistic simulations. For the modeling, a detailed description of the VVER- 1000 (V-392) RPV was used as the base model. The design difference in fuel assembly and RPV height for the VVER-1200 RPV is taken into consideration. As the result of using the described 3 dimensional modeling for the simulations of the thermal-hydraulic behavior of the VVER-1200 reactor core, the temperature distribution and pressure drop are calculated. The calculated values are in good agreement with the values reported in the literature.

**Keywords:** VVER-1000, VVER-1200, CFD, Reactor Pressure Vessel, Porous Media Approach

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