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ŚWIERK

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Piotr Prusiński

GoHTR: CFD study of Reactor Cavity Cooling System capacities

Abstract:

Reactor Cavity Cooling System (RCCS) is a safety class system. Its main purpose is to allow for residual (waste) heat retention management in the Reactor Pressure Vessel (RPV) surroundings. In this presentation, one will find the concept of RCCS considered for the THeResa reactor developed under the GoHTR project. In this specific design, it is assumed the RCCS is a steel mantle composed of 260 equidistant water pipes and flat panels in-between. Every second pipe belongs to one of two RCCS subsystems allowing for safety feature redundancy. Such a configuration allows for different modes of operation and as for that could be handled by System Thermal-Hydraulic Codes to be assessed. However, there was uncertainty related to heat transfer parameters due to geometrical details and its dimensions, i.e. the corrugated surface of an RCCS mantle, against heat radiation and as such required further studies by means of Computational Fluid Dynamics (CFD) codes.

In that sense, one should see this CFD research not as separate but rather as a complementary study that was developed to validate some assumptions set to System T-H Codes. CFD, here, serves as a magnifying glass to extend the knowledge on geometry-related physics that the other type of codes simply cannot account for.

It has to be noted that all the simulations have been based on and performed according to the current GoHTR specification. Based on the given dimensions and initial conditions several cases have been run and post-processed. The main aim of simulations was to deliver heat transfer coefficient (HTC) profiles at the RPV and RCCS walls.

The presentation will consist of not only different modes of RCCS operations and the resulting HTC profiles but also the elements of CFD results accuracy assurance methodology applied to the study (as it consumes most of the merit time of the study).

Serdecznie zapraszamy
M. Dąbrowski, T. Kwiatkowski
http://www.phd4gen.pl