Reviewer 1

Bring similarity from 27% to below 15%...Explain the need to use CFD since MELCOR is the standard code for such purpose…

Dear Reviewer,

Thank you for your comment. According to https://www.energy.gov/ehss/melcor:
“MELCOR is a fully integrated, engineering-level computer code developed for the Nuclear Regulatory Commission whose primary purpose is to model the progression of accidents in light water reactor nuclear power plants. (...)”.

Our paper is devoted to the High-Temperature Reactor of a unique design with scarce reference. It is not a LWR, so the approach is not standard.
Due to this fact, the application of the MELCOR code was not validated against specific experimental data, in this case, the RCCS experiments.
From this, there was a need to perform confirmatory and exploratory calculations using CFD code for the specific design RCCS configuration of the Polish HTGR. This enabled us to verify the results of the MELCOR code and conclude with a recommendation for its further use in integral calculations. Secondly, MELCOR developers clearly state that further validation to HT(G)R is still ongoing, and we believe our work could be a contribution to that topic (https://www.sandia.gov/MELCOR/verification-and-validation/)

Reviewer 2

Dear Reviewer,

Thank you for your valuable comments and constructive criticism. Below are our responses.

1) Authors should use the enclosed template and format their contribution accordingly. This is widely applicable throughout the paper and includes: the header, the contribution title, subtitles, equations, abbreviations and references.

The formatting of the paper was corrected.

2) Equation 1 is not very clear. It indeed indicates that the heat transfer coefficient is calculated based on the higher of the two Nusselt numbers. However, it lacks the characteristic length and the thermal conductivity of the fluid to be complete. Would it be possible to make this more clear or make a comment on this?

The characteristic length is based on the hydraulic diameter of the annular channel. The thermal conductivity is from the fluid properties. Additional comment has been added to the presented equations.

3) When describing the MELCOR model, it is said that the RCCS surface is treated as a cylinder for the purposes of the radioactive heat transfer. This should overestimate the (radioactive) heat transfer to the RCCS and underestimate the heat transfer to the surrounding coolant, thus resulting in a non-conservative estimate of the RPV wall temperatures. This is particularity important as it is said that the radioactive heat transfer amounts to 80 % of the total heat transfer. Would it be possible to make a comment on this, or make it more clear if it is not correctly understood by the reader?

Thank you for this comment, we agree. Both in MELCOR and in 2D axisymmetric simulations the RCCS surface was treated as a cylinder and it may lead to underestimated temperatures.

We are aware of this issue. Therefore we made a preliminary 3D simulation to assess the impact of this simplification on the obtained temperatures, please see Fig. 12 and the comparison between cases #3 and #4. The three-dimensional case 4 has a non-cylindrical RCCS surface shape.

Although the differences in temperatures were negligible, this might not be the case in general. We are currently working on a 3D model which includes both inner and outer cavities, for various geometries. In the future, we are planning to compare the obtained view factors from various 3D designs and their impact on RPV temperatures.

We added more comments on this topic in the conclusions.

Other than the above mentioned, a very well written paper. Congrats!

Thank you for your positive evaluation of our work.