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Thermal-hydraulic and source term deterministic analysis demonstration study for non-electrical applications HTGR

Abstract:

The work presented in the study is focused on the deterministic analyses of the HTGR for non-electrical applications. The work is a continuation of the activities undertaken at the NCBJ, which has been the project coordinator of the Horizon 2020 GEMINI Plus project, during which the concept of a small reactor for industrial applications (180 MWth) was established. This reactor concept was introduced for the purpose of high temperature and pressure steam supply to industrial sites. The work undertaken by the project partners was a grounding knowledge and experience for Polish entities, which launched later on the national GOSPOSTRATEG-HTR project aiming at the pre-conceptual design preparation of the small research HTGR and preparation of the methodology of licensing process on its example. The small demonstration reactor is a pre-concept based on the aforementioned GEMINI+ HTGR solution which in turn was built on the knowledge acquired in the past European R&D projects as well as existing HTGR designs, like GT-MHR, MHTGR, and SC-HTGR.

The tasks involved detailed iterative effort in the neutronic and thermal-hydraulic design development of reactor pre-concept, which was based on the deterministic analyses in the field of core neutronics, area of primary loop thermal-hydraulics with the demonstration of the source term evaluations and operation of Reactor Cavity Cooling System (RCCS). The evaluations of the reactor system responses in the frame of preliminary safety analysis were investigated against typical prismatic HTGR Design Basis Accidents (DBA), like most challenging ones such as the Depressurized Loss of Forced Cooling (DLOFC) accident, Pressurized Loss of Forced Cooling (PLOFC), along with Water Ingress event.

Serdecznie zapraszamy
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Bio:

Eleonora Skrzypek senior R&D specialist, has more than 10 years of experience in Nuclear Safety Analysis. She graduated Faculty of Power and Aeronautical Engineering, at Warsaw University of Technology with a specialization in Nuclear Engineering. Part of the Master Program made during Erasmus exchange program in KTH, Sweden.

In NCBJ she was starting with the neutronic calculations of the large LWRs and thermal hydraulic analysis using system codes for the BEPU demonstration. Since 2016 involved in the In-Vessel Melt Retention project regarding the propagation of severe accidents in the high power LWRs and interested in generation IV reactors analysis, including accidental analysis. During 10 years career had the opportunity to work in international working groups in CEA Cadarache, France and the University of Illinois at Urbana Champaign, US on the deterministic tools development and use in various generation III+ and IV reactors research areas. She gained her experience by participation in many workshops organized by IAEA, GIF and NEA and presenting scientific results in many international conferences. Currently working in National Centre for Nuclear Research at the Division of Nuclear Energy and Environmental Studies – Reactor Analysis Section.