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## **Seminarium Zakładu Energetyki Jądrowej i Analiz Środowiska (UZ3) Departament Badań Układów Złożonych (DUZ)**

Wtorek: **03.11.2020**  
**11:30**

**Michał Jędrzejczyk**

### **Establishment of reasonable model to simulate emergency passive coolant system in HTTR reactor**

#### **Abstract:**

International Atomic Energy Agency (IAEA) Coordinated Research Program (CRP) on "Heat Transport and Afterheat Removal for Gas-cooled Reactors under Accident Conditions" started in November 1993. In this program, benchmark tasks were proposed for the analysis of passive afterheat removal from gas-cooled reactors (GCR) under accident conditions. The specific objective of the benchmark program is to capture the essential heat transfer features of reactor-to-reactor vessel cooling system (VCS) and provide useful information applicable to a wide variety of designs, operating conditions and model parameters.

In the present study, a 1/6 scale model of VCS for High-Temperature Test Reactor (HTTR) was used to develop a reasonably accurate thermal-hydraulics model of a passive cooling system. HTTR is a graphite-moderated gas-cooled research reactor in Oarai, Ibaraki, Japan, operated by the Japan Atomic Energy Agency (JAEA). The reasonable 2D model was established by using ANSYS Fluent software. In the study temperature profiles of the outside of the scaled reactor vessel for three experiment configurations were obtained numerically and compared with experimental results. The numerical results showed good agreement with the experimental ones.

Moreover, a simplified numerical approach has been proposed and new heat transfer coefficients were determined. The approach allows for a two-fluid system simulation with significantly reduced computational costs.

The study was conducted as part of the author's master's thesis at the Warsaw University of Technology.

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M. Dąbrowski, T. Kwiatkowski

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