

Dutch Thermal Hydraulic Design and Safety Support for LMFRs

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Liquid metal fast reactor have a prominent role in the roadmap of the Dutch nuclear stakeholders. As nuclear service provider in the Netherlands, the Nuclear Research and consultancy Group (NRG) has established an elaborate program on liquid metal thermal hydraulics. This paper describes the thermal hydraulic design and safety support activities of NRG. The paper will start with the development of tools to allow thermal hydraulic system analyses. For this, the SPECTRA code, under development at NRG, has been adapted to facilitate to application of various liquid metals. The paper will provide a short description of the tool and show some examples of liquid metal applications. Since liquid metal reactors typically employ large liquid metal pools in which 3-D effects are unavoidable, a generic multi-scale modelling approach is being developed coupling the SPECTRA code to CFD codes. The paper will update the reader on the progress. Gradually, the paper will zoom in on more detailed analyses employing CFD codes for liquid metal pools, including important components like pumps, heat exchangers, and the core. For the core, past and ongoing activities will be shown related to validation of CFD approaches based on assemblies as they are designed on the drawing board, but also application and where possible validation of deformed and blocked fuel assemblies. Finally, the fundamental activities on understanding and pragmatic engineering model development for turbulent heat flux will be presented.

Country/Int. organization

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