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

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Mini-demonstrator of Dual Fluid Reactor: a component compatibility study

Abstract:

Dual Fluid Reactor (DFR) is an innovative concept for a new very high temperature Generation IV reactor. It is unique because of the use of two separate liquid metal cycles, this solution allows to obtain advantageous features like high power density and due to strongly negative temperature feedback coefficient self-regulation of power. So far no unit in the system of such a reactor has been built. The main objective of my research work is to construct an actual high-temperature research facility - a mini DFRm demonstrator, which will be used for long-term corrosion research in addition to other applications. The operating conditions and the very high chemical activity of the liquids, (depleted)uranium-chromium eutectic and lead, require a number of extensive and profound preparations. For this purpose, a literature review of research units involved in experiments with similar conditions, materials or apparatus has been done. In both loops, four main parts can be distinguished: the core with the heating elements, the cooling exchanger, the propulsion part and the part with the measuring instruments. As numerous studies in various facilities have shown, there are many possibilities for each of these components. Due to material constraints, I have to define and select them in such a way that they are compatible with all other parts. These limitations are, among others, the oxygen content in the solution, bonding with ceramics, maximum allowable temperatures for sensors, oxygen pumps, conventional pump systems. Different design solutions and findings for the outlined parts and problems will be presented.

Serdecznie zapraszamy
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