

the outlet nozzle. There are three thermocouples in each channel to measure the clad temperature and one thermocouple to measure the fluid temperature. Three series of experiments, for three different core configuration were carried out with the instrumented fuel assembly. In two experiments a box was installed around the core to reduce the cross flow between the fuel assembly and measure the impact in the temperatures of external plates. The experimental results obtained with the instrumented fuel element are very consistent with the phenomenology involved. Given the amount of information generated and its utility in the design, improvement and qualification in construction, assembly and manufacturing of instrumented fuel, this project turned out to be an important landmark on the thermal-hydraulic study of research reactor cores. The proposed solutions could be useful for other research reactors.

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THERMAL-HYDRAULIC ANALYSIS OF THE IEA-R1 RESEARCH REACTOR – A COMPARISON BETWEEN IDEAL AND ACTUAL CONDITIONS

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P.E. Umbehaun^a and W.M. Torres

^a umbehaun@usp.br

Nuclear and Energy Research Institute, São Paulo, Brazil

Thermal-hydraulic analysis were performed for the IEA-R1 research reactor considering ideal, estimated and actual flow rate conditions through the fuel elements. The ideal conditions were obtained dividing the total primary flow rate among the fuel elements and the estimated conditions were calculated using the computer program FLOW. The actual flow rate conditions were experimentally measured using an instrumented dummy fuel element. The results show that the actual conditions are far from ideal and calculated ones due to the high bypass flow that deviates the active reactor core through the irradiation devices, gaps, couplings, etc.. Thus, the safety margins are smaller for the actual flow conditions.

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