

EXPERIMENT RESULTS FOR HEATED ROD IN THE L-STAR FACILITY

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Heat transfer enhancement through turbulence augmentation is recognized as a key factor for improving the safety and economic conditions in the development of both critical and subcritical innovative advanced gas cooled fast reactors (GFR) and transmutation systems. The L-STAR facility has been designed and erected at the Karlsruhe Institute of Technology (KIT) to study turbulent flow behavior and its heat transfer enhancement characteristics in gas cooled annular channels under a wide range of conditions. The test section consists of an annular hexagonal cross section channel with an inner electrical heater rod element, placed concentrically within the test section, to simulate the flow area of a fuel rod element in a fast gas cooled reactor. Tests are being conducted in a closed gas loop at various Reynolds numbers with uniform heat release conditions for the further development and validation of different physical models. In this paper, steady state experimental results for a smooth and structured heater rod are presented. The pressure drops, as well as axial temperature profiles along the heater rod surface have been measured at Reynolds numbers in the range from $4 \cdot 10^3$ to $3.5 \cdot 10^4$. The experimental results were compared with empirical correlations.