

# Experimental study of natural circulation circuit

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The experiment was performed through experimental thermal-hydraulic circuit built at IEN. The heat source of circuit represents the heat dissipated by electrical resistors, through Joule effect, that is transformed into thermal energy. This heat generation, translates in reduced scale, the thermal power generated in stages of shutdown or failure, the power decay of nuclear reactions inside vessel of APWR.

This experimental study aims to observing and analyzing the natural circulation phenomenon, under conditions of single-phase flow, using this experimental circuit that was dimensioned and built based on concepts of similarity and scale [1-2].

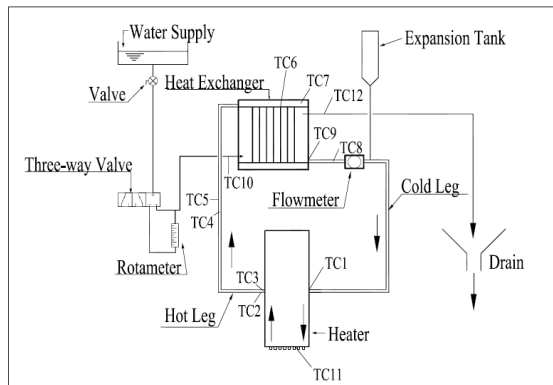


Figure 1. Schematic of natural circulation circuit and points of measurements through thermocouples.

The behavior of the natural circulation phenomenon was monitored by graphical interface on computer screen. Data acquisition system allows to measure and to monitor the evolution of the temperature in various points through thermocouples installed in strategic points along hydraulic circuit.

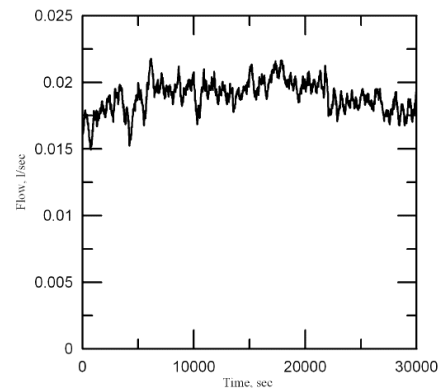


Figure 2. Excursion of the natural circulation flow in hot leg.

Finally, the calculus of Reynolds number allowed the establishment for a correlation of friction in function of geometric scales of length, heights and cross section of tubing, considering a natural circulation flow throughout in the region of hot leg [3].

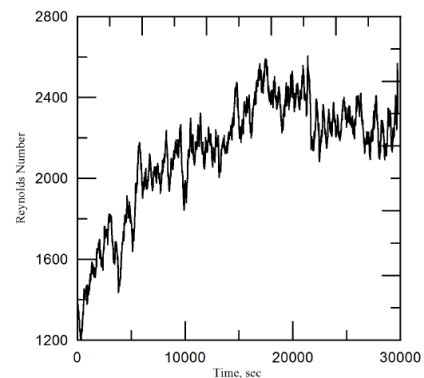


Figure 3. Reynolds number in hot leg tube.

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