THE EVALUATION OF THE EXPERIMENTS ON BOILING PERFORMED IN THE WIW-300 INSTALLATION

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The experiments performed in a test section in the WIW-300 installation are the basis for drawing conclusions about different phenomena observed in boiling process.

The test section was an assembly of two coaxial pipes with a 2.5 mm gap between them. The test section was electrically heated and some effects related to two phase flow were registered. There were over one hundred experiments performed. In thirty of them the results were similar and it is possible to formulate some conclusions.

1. In the test section an increase of inlet pressure was observed. It was the beginning of a specific thermohydraulic phenomenon which led to burnout effect. There was a simple relation between heating P [kW] and discharge of cooling water - flow intensity G:

$$P = k \times G,$$

where k is a constant with values $42 \div 64$ [kWh/m^3] and
G is flow intensity [m^3/h].

2. The phenomenon was initiated by 0.3 sec increase of inlet pressure and could be qualified by changes of differences between inlet and outlet pressure. In the next 2 seconds there were observed several thermohydraulic phenomena like: changes of flow intensity, pressure oscillations and wall temperature changes. They were difficult to qualify because of lack in instrumentation (no void fraction nor outlet velocity of flow was measured). Probably these phenomena were connected with the increase of bubbles and with changes in hydraulic structure of the flow (bubble flow, Taylor bubbles, mist flow).

3. Specially interesting because of burnout effect, was choking the test section with saturated or overheated steam. It was recorded in experiments in which a bypass of the test section has been used. This phenomenon was observed for almost three seconds, the flowmeter indicated a decay of flow at that time. Choking test section with steam and pressure oscillations indicated the manifestation of the Leddineg's instability. The detected oscillations could be estimated with equations which designate the Helmholtz wave in compressibility wave model.

4. Heat exchange between walls and cooling mixture (steam and water) has been changing at the time of observed phenomenon. Generally the value of heat transfer coefficient monotonously decreased to the value ten times smaller than at the beginning. More detailed information were presented in [1].

REFERENCES:

[1]. P.Czerski „Sprawozdanie z seminarium - Badanie oporów przepływu wrzącego chlodziwa w reaktorze jądrowym Maria" Raport B IEA Nr 69/97.