HYDRAULIC CHARACTERISTICS OF THE REACTOR PIK FUEL ELEMENTS

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The thermophysics calculations for the research reactor PIK operating conditions, shut-down cooling, emergency conditions and calculations cladding temperature of the fuel elements in the cassettes unloading out of core are connected with definition of the water velocity in interfuel space. For that it is necessary the data on the hydraulic resistance of the cassette PIK in wide flow velocity interval. This data are necessary also for comparison thermophysics possibilities of the PIK fuel assemblies and the other types of fuel element which may be used in the reactor PIK.

At present the data on hydraulic resistance of the PIK cassette are contradictory and known only for the water velocities of 10.0 and 12.5 *m/s*.

On the test plant the hydraulic characteristics of the PIK cassette had been measured in the velocity interval from 0.1 to 16.0 *m/s*. Measurements had been developed on the model of the PIK cassette consisted of the 37 fuel elements

The plant made possible to measure pressure drop on the cassette and on the fuel path 100, 200, 300 *mm*. This measurements allowed to determine a coefficient of the hydraulic resistance of the cassette (fig.1), friction coefficient in the interfuel space and also entrance and exit loses of the cassette lattice.

It was defined experimentally the summary fraction of the resistance of the lattice which not exceeds 11% from summary resistance the PIK cassette. It was determined that measured friction coefficient in the interfuel space about 1.5 times more than ones calculated by expression for the smooth tubes.

Hydraulic resistance of the PIK fuel elements was not be corresponded to the resistance of channel constant equivalent roughness, the last depends on the water flow velocity. Essential difference of the friction coefficient (z) of the PIK fuel elements from ones for the smooth tubes are indicated on the increasing intensity of the heat transfer.

It may be expected that heat transfer coefficient for the PIK fuel elements which is proportional to $\sqrt{\zeta}$ must be approximately 20% more than for the smooth channels formula for which at present are used for all kinds of the PIK heat engineering calculations.

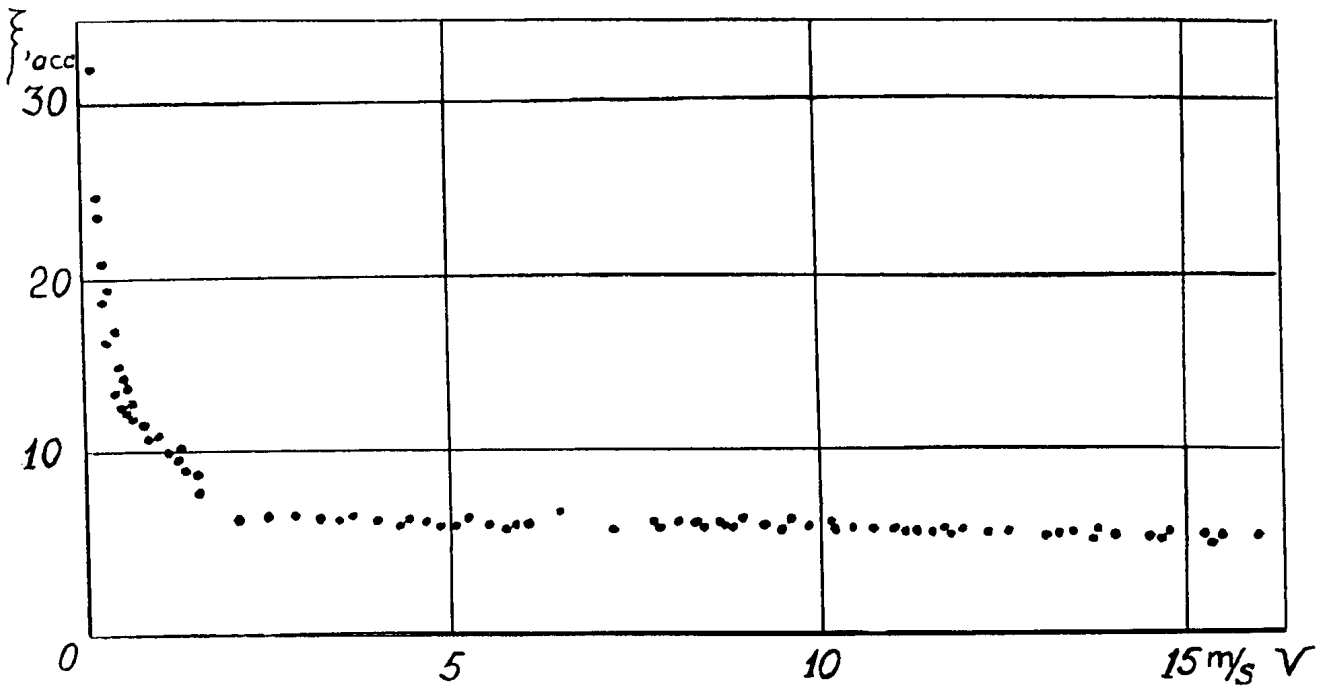

Fig. Hydraulic resistance coefficient of the PIK cassette depending on water velocity.

This circumstance underestimates essentially the heat physical quality of the PIK fuel element and demands experimental verify.

Experiments carried out allows to verify many thermophysical and hydraulic calculations for the PIK operating and emergency conditions and can be used for the calculations other reactors worked on an similar fuel elements.