DISTRIBUTION OF THE ENERGY RELEASE IN THE REACTOR PIK CORE (from results, measured on PM PIK)

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On the physical model (PM) of the PIK reactor the energy release for some typical working reactor regimes has been investigated.The energy release (D_f) has been measured by means of activated fuel elements and uranium-aluminium foils [1,2] and has been calculated by DOT 3—5 code [3] by means of the VITAMIN-C cross-section library [4] and AMPX-II modular code system [5].

Measured and calculated energy release unevenness in the core in radius (K_r) and the height (K_z) for each fuel assembly (FA) are shown in the table.

The energy release unevenness in the core in volum (K_V) versus of the distances between absorbing ends of central control device for the unburned profiled core are shown on figure.

The results of measurements and calculations are in a good accordance.

For decreasing of the K_V the fuel profiled core has been made. In the cells of the FA, bounded with the central chanel (CEC), the fuel elements with the 1/3 fuel quantity from the nominal velue have been loaded. The K_V has been decreased from (3.8 ± 0.3) to (2.9 ± 0.3) in the fuel profiled core.

The results about the energy release unevenness in the core are needed in calculation of maximum power of the core are needed in calculation of maximum power of the PIK reactor.

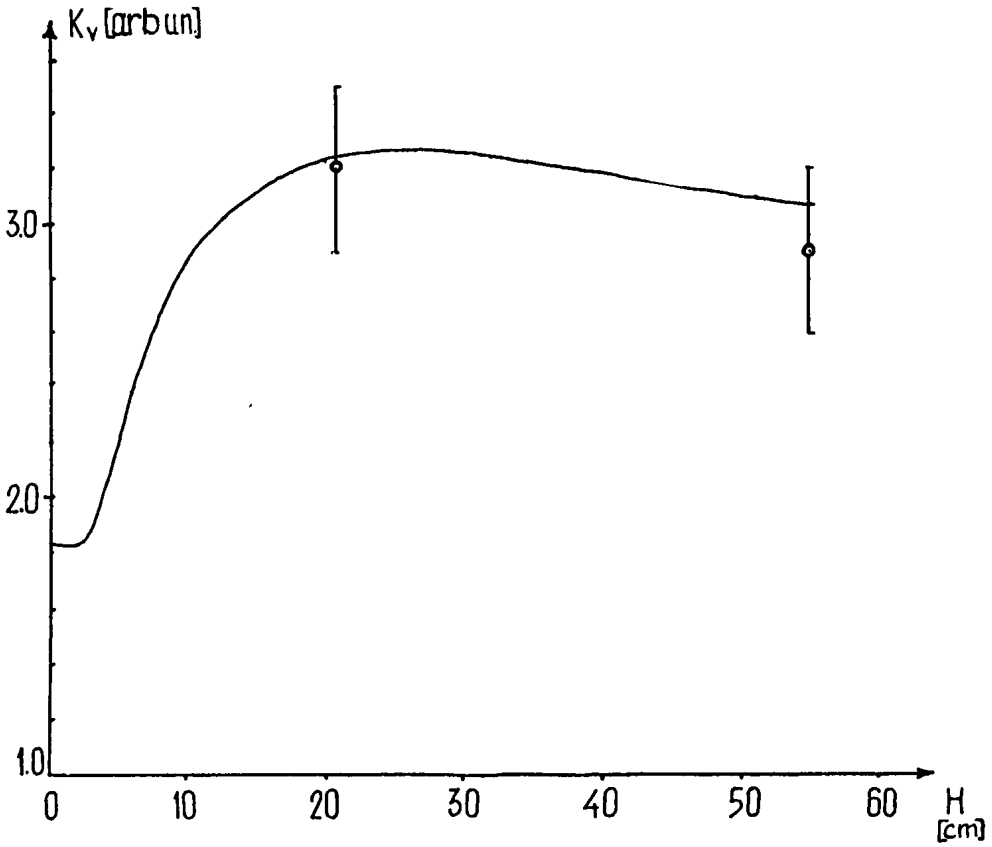

Fig. The energy release unevenness (K_V) versus of the distances between absorbing ends of the central control device for the unburned profiled core

Table

The energy release spatial nonuniformity in FA (the central control device is out of the core)

			TVS hexahedral on the boundary wiht CEC	TVS hexagedral on the boundary with the vessel	TVS tetrahedral
Part of the energy release of 6 FA in full energy release in profiled core		measured	(45 ± 3)%	(33 ± 2)%	(22 ± 2)%
		calculated	44%	33%	23%
Ratio of the mean FA energy release and the mean core energy release in profiled core		measured	1.18 ± 0.06	0.88 ± 0.04	0.92 ± 0.05
		calculated	1.18	0.89	0.91
The unprofiled core		K_r	2.5 ± 0.3	1.5 ± 0.2	1.8 ± 0.2
		K_z	1.30 ± 0.04	1.29 ± 0.04	1.29 ± 0.04
The profiled core	K_r	measured	2.02 ± 0.2	1.5 ± 0.2	1.8 ± 0.2
		calculated	2.1	1.6	1.9
	K_z	measured	1.30 ± 0.04	1.28 ± 0.04	1.28 ± 0.04
		calculated	1.29	1.27	1.27

References

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5. AMPX-II:Modular Code System for Generating Coupled Multigroup Neutron-Gamma-Ray Cross Section Library from Data in ENDF Format. RSIC-PSR-63. 1978.