When T $\approx$ 1 keV the splitting comprises $\approx$50-150 $\AA$ and is easily found.

Probing of the plasma with a light beam having a variable frequency can also give information on the spectrum of the Langmuir oscillations.

In experiments on the heating of a plasma by a laser pulse the choice of diagnostic methods is very limited (direct methods of measurement of the velocity of dispersion of the plasma, e.g., are entirely absent). Therefore, the study of the fine structure of CS lines can be an important source for obtaining data on the parameters of the plasma and the mechanism of its interaction with the laser radiation. At the same time, there is no doubt that the arguments presented are in serious need of experimental verification.

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LITERATURE CITED


USE OF THE CALORIMETRIC METHOD TO MEASURE THE ENERGY RELEASE IN A COMPENSATING ROD

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The development and refinement of experimental methods of determining the energy release in the compensating rods of a reactor are urgent for the practical work of reactor construction and for the development of calculating methods. To obtain greater reliability it is desirable to measure the energy release by several independent methods. Along with the relative physical method described in [1], in the present report a highly sensitive calorimeter is proposed and used for the measurement of the energy release in a boron-containing rod of a critical installation. Despite the wide reputation of the calorimetric method, it is used mainly for dosimetric purposes [2] and for the determination of heat release in specimens under the conditions of power reactors [3] because of its relatively low sensitivity.

Sensitive calorimeters ($10^{-6}$ W/g) have recently been created which have made it possible to measure the energy release in fissionable materials in a critical installation [4]. And only the appearance of such sensitive temperature detectors as microthermistors has made it possible to increase still more the sensitivity of the calorimetric method (up to $10^{-7}$ W/g).

The aim of the present report is the creation of a highly sensitive calorimeter, the measurement of the energy release in an absorbing rod of a critical installation, and the comparison of the measurement results of the calorimetric and physical methods.

Calorimetric Method. The proposed highly sensitive calorimeter belongs to the quasi-adiabatic type. The principle of its operation is based on the measurement of the rate of change of the temperature of a specimen isolated from the external medium. The temperature of the specimen varies by an linear law during a certain time, which depends on the thermal insulation of the specimen, its geometrical dimensions, and other factors. The cylindrical specimen of boron carbide 19.2 mm in diameter and 30 mm high was insulated from the other parts of the rod by foam plastic and by an air gap 1 mm thick, and from the lateral walls

Fig. 1. Diagram of calorimeter for measuring radiation energy release in a boron carbide rod: 1) holder (aluminum); 2) outer shield (aluminium); 3) insulator (foam plastic); 4) cylindrical specimen of boron carbide; 5) MT-64 thermistor; 6) remaining part of absorbing rod.

of the reactor channel by an air gap of 5–7 mm. During heating of the specimen in the reactor through radiation energy release the length of the linear temperature rise was 150–200°C. This is also confirmed by calculations. With more prolonged heating the heat exchange between the specimen and the surrounding medium shows up, which disturbs the linear rise of the specimen temperature. For a linear temperature rise with time the specific energy release in the specimen per unit time owing to the (n, α) reaction in boron and the absorption of the γ and β radiation of the reactor is determined from the equation

\[ Q = C_p \frac{dT}{dt} W \gamma/(gW), \]

where \( C_p \) is the specific heat capacity of the specimen; \( \frac{dT}{dt} \) is the rate of change of the specimen temperature; \( W \) is the reactor power. Thus, to determine \( Q \) one has to measure \( \frac{dT}{dt} \), \( C_p \), and \( W \).

A diagram of a calorimeter for measuring the radiation energy release in a boron carbide rod placed at the center of a PF-4F8 critical installation [5] is presented in Fig. 1. The temperature detector, and MT-64 thermistor (\( R = 64.5 \) kΩ at 20°C), was fastened to the lateral surface of the thermally insulated specimen. The sensitivity threshold of the calorimeter was \((1-2) \times 10^{-6} \) W/g, and a power of 10 W liberated in the active zone of the installation was enough to perform the measurements.

In order to allow for the effect of heat exchange between the surrounding medium and the specimen on the rate of temperature change, the quantity \( \frac{dT}{dt} \) was measured during three time periods with the same duration of 150–200 sec, corresponding to different reactor states:

\[ \frac{dT}{dt} = (\frac{dT}{dt})_m - 1/2 [(\frac{dT}{dt})_i + (\frac{dT}{dt})_f], \]

where \( (\frac{dT}{dt})_i \) is the rate of change of the temperature of a specimen placed in the reactor in the initial period; \( (\frac{dT}{dt})_m \) is the rate of temperature change in the main period, when dynamic equilibrium is established in the heat exchange between the specimen and the surround-