REACTOR WWR-M IRRADIATION POSSIBILITIES

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Nuclear research reactor WWR-M [1] is a pool type reactor with small water level over the core (3.5 *m*). There is a simple access to the fuel elements and experimental devices in the core.

The core of 500 *mm* height is formed by the fuel elements with developed heat transfer surface of 6.6 cm^2/cm^3 [2]. Fuel elements, ampoule devices, experimental channels, lead and beryllium rods, control rods and other devices are disposed in 271 cells of supported grid with triangular pitch of 35 *mm*. Small-size control rod in any sell and assemble the critical mass of any configuration A half of the core volume is occupied with experimental facilities. Usually up to 15 ampoules 35 *mm* in diameter are irradiated. A number of ampoules may be increased. The ampoules are shielded with lead plugs in order to reduce heat release in irradiation materials. There is a liquid hydrogen source of cold and iltra cold neutrons in the center of the core. In the 14 *cm* beryllium reflector there are 13 vertical channels for irradiation specimens of materials and 10 horizontal channels to form neutron beams. 9 vertical channels with 40 *mm* diameter and 1 with 60 *mm* diameter are cooled with primary circuit. One loop channel has an independent cooling circuit for irradiation tests of different fuel elements and other heat releasing materials. The construction of a loop channel permits to load and unload fuel elements during the reactor operation.

There is a low temperature channel in reactor used for irradiation high-temperature superconductivity materials (HTSC) at 20—30 *K* in neutron flux 10^{14} $n/cm^2 \cdot s$. The HTSC channel is supplied with a measuring system for electrical and magnetic properties of HTSC materials during irradiation [3].

The heliuv cooling HTSC channel, the water cooled loop channel and some part of ampoule devices are instrumented with thermocouples.

Irradiated material is transferred into the hot cell for mechanical treatment. There are other hot cells for radiochemical and material testing investigations. The radioactive waste are treated at a special plant.

The reactor operates at a power up to 18 *MW*, the duration of cycles is two weeks. Maximum thermal meutron flux density in the irradiation channels is $1.5 \cdot 10^{14}$ $n/cm^2 \cdot s$, fast flux with energy above *1 MeV* is $1.5 \cdot 10^{14}$ $n/cm^2 \cdot s$ in the core. Energy release varies from 10 *W/g* in the core to 0.3 *W/g* in the reflector [4].

Thermal and fast fluencies of materials are determinated with error 5% and 10% accordingly by means of calculation and experimental methods. The thermal neutrons flux is measured by activation ^{59}Co and ^{58}Fe, fast flux — by ^{54}Fe according to the reaction (n,p), and ^{63}Cu according to the reaction (n,α) [5].

References

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