



Contribution ID: 310

Type: Oral Presentation

W1 The Thermal and Nuclear Measurement Systems of MARIA Reactor

Monday, June 9, 2025 11:15 AM (45 minutes)

The MARIA research reactor is operated by the National Centre for Nuclear Research in Otwock, Poland. The MARIA reactor is a water and beryllium moderated reactor of a pool type with graphite reflector and pressurized channels. The fuel channels are situated in a matrix containing beryllium blocks. The MARIA reactor has been operating since 1974, and it has power up to 30 MW. Current main reactor applications: production of isotopes (Tellurium, Sulfur, Samarium, Cobalt, Iridium, etc.), irradiation of uranium plates for the production of molybdenum (LEU), material testing (operation of the high-temperature capsule), research and training. The MARIA reactor is operated for more than 4000 hours at nominal power per year.

MARIA Reactor team we have extensive experience in operating various types of MARIA reactor measurement systems, which have been upgraded in particular neutron flux measurement instruments. We have instruments made in various technologies, analog and digital. The reactor is equipped with eight neutron measurement lines divisible in terms of measured parameters and functions. The systems use different types of neutron detectors such as fission and ionization chambers. Will be presented the characteristics of the detectors and systems, connections to other reactor systems such as control and protection, and use of the apparatus during various stages of reactor operation. Will be described the most interesting other measurement systems used in the MARIA reactor power measurements, measurements of the activity of fission products in the circuit. The MARIA Reactor is equipped with an extensive system of thermal-fluid measurements, which provide information about operating parameters for each of the fuel elements in the core. The measurement data are processed and used in many applications such as calculations burn up of fuel, neutron calculations, and estimating the activity of irradiated materials. Signals are also processed by the reactor's protection system.

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Session Classification: Workshop N°1: Nuclear instrumentation and measurement in research reactors