

# International Conference on Fast Reactors and Related Fuel Cycles: Next Generation Nuclear Systems for Sustainable Development (FR17)



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## BREST-OD-300 REACTOR FACILITY. DEVELOPMENT STAGES AND JUSTIFICATION

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BREST-OD-300, an innovative natural-safe fast reactor, is being developed as a pilot and demonstration prototype for the base commercial reactor facilities of future nuclear power with a closed nuclear cycle.

Coolant in the reactor facility is lead, the layout of the primary circuit is integral, the reactor vessel material is multilayer metal concrete. The reactor core design uses mixed uranium-plutonium nitride as the fuel, and the fuel elements are contained in shroudless fuel assemblies (FA). Small reactivity margin, excluding prompt-neutron runaway is provided in the core.

Decisions are based on a computational and experimental justification. To confirm the fuel serviceability, radiation tests of fuel elements are conducted in fast reactors. Full-scale fuel-free mockups of FA are tested. Tests have been conducted of the vessel elements. Experiments have confirmed the absence of a dependent break of steam generator tubes. Neutronic codes have been verified, including with the use of BFS critical assemblies. Loop facilities have been built on which studies are conducted to determine the radionuclide release from the coolant.

It has been shown based on the calculation results that the probability of the core damage (without core melting) for nuclear power plants with the BREST-OD-300 reactor facility does not exceed  $8.65 \cdot 10^{-9}$  1/year.

### Country/Int. Organization

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