Contribution ID: **20** Type: **ORAL**

Fundamental Approaches to High-power Fast Reactor Core Development

Wednesday, June 28, 2017 2:10 PM (20 minutes)

The article examines approaches to developing a core for a high-power lead-cooled fast reactor in compliance with the formulated safety requirements and technical and economic specifications. A particular focus is made on achieving inherent safety properties, such as: a negative void effect, negative reactor power and coolant temperature coefficients, uniform coolant heating in the reactor core, as well as minimal operating reactivity margin and overshoot of reactivity during the core lifetime, which eliminates the potential risk of prompt neutron power excursion.
Constraints of reactor core characteristics in terms of acceptable power level, heating temperatures and lead coolant flow rate are considered in relation to the development level of available structural materials and lead coolant technology.
A comparative analysis of the impact of various factors (fuel rod geometry, spacing of triangular fuel rod lattice, fuel density) on characteristics of BR 1200 lead-cooled reactor core with a thermal power of 2,800 MW (void effect, reactivity margin during core lifetime, critical core loading) is conducted and trends of these characteristics are plotted depending on the fuel weight fraction.
Solutions aimed at reducing the irregularity of coolant heating and radial power peaking factor in a high-power reactor are evaluated.
Solutions aimed at reducing the irregularity of coolant heating and the radial power irregularity in a high-power reactor are evaluated.

Country/Int. Organization

Russian Federation

Primary authors: Mr SHEVCHENKO, Aleksei (Innovative &Technology Center by "PRORYV" Project); Mr DEDUL, Alexander (Innovative &Technology Center by "PRORYV" Project); Mrs RODINA, Elena (Innovative &Technology Center by "PRORYV" Project); Mr CHERNOBROVKIN, Yuri (Innovative &Technology Center by "PRORYV" Project)

Presenter: Mrs RODINA, Elena (Innovative &Technology Center by "PRORYV" Project)

Session Classification: 1.6 CORE AND DESIGN FEATURES - 2

Track Classification: Track 1. Innovative Fast Reactor Designs