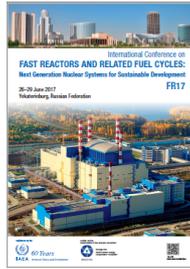


# International Conference on Fast Reactors and Related Fuel Cycles: Next Generation Nuclear Systems for Sustainable Development (FR17)



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## System of Codes and Nuclear Data for Neutronics Calculations of Fast Reactors and Uncertainty Estimation

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Designing of neutronics characteristics of fast reactor cores and fuel cycle requires to use certified and qualified sets of computer codes and nuclear data. The calculation codes should be related to the modern state of computational techniques. The used nuclear constants should be adequate to the most reliable evaluations, adopted in modern libraries of evaluated nuclear data.

The paper consider a modern state of Russian neutronics computer codes and nuclear data used in fast reactor applications for calculation of core and nuclear cycle parameters.

The ROSFOND evaluated nuclear data files and the ABBN group data set are used as the basis of nuclear input data. The ROSFOND library now contains about 650 files of data for most important and not so important reactor materials. The selection of files was made based on BROND-3, ENDF/B-VI.8 and VII.0, JEF-2.2 and JEFF-3.1, JENDL-3.3 evaluations by comprehensive study of their quality. For treating the ABBN data the special code system CONSYST/ABBN was developed.

Three directions in developing of codes for fast reactor neutronics calculations can be stated: (1) discrete codes, (2) based on Monte-Carlo, (3) used synthesis methods. Codes, which are used in the design calculations, mostly solve the Boltzman transport equation in diffusion approximation, they are: TRIGEX, JARFR, GEFEST, FACT-BR, SYNTES. Codes, which are based on Monte-Carlo method, were developed during many years. Nowadays they have additional impulse in interest due to fast developing of the computational technique. Recently a code MMKK was developed. It now used in planning and analyzing of reactor-physics experiments as well as for precise calculations of fast reactors BN.

For the shielding calculations as well as for determining diffusion-transport corrections codes TWODANT and DORT-TORT are used. For the depletion and kinetic calculations CARE and ORIGEN codes are used.

The main feature of the all mentioned codes is that they use one, same and unique constants data base ABBN with the code CONSYST for generation of effective cross-sections.

The system INDECS of codes and archives is now used for uncertainty estimations which is based on usage of perturbation theory and covariance matrices of nuclear constants. The TRIUM code based on GRS method is now developed. It is a synthesis of TRIGEX, MMKK and INDECS codes.

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