



The Neutronic Model of a Nuclear Fission Reactor

Design and operation of a nuclear reactor aim to the safe and secure utilization of the energy released by a controlled chain reaction of nuclear fissions maintained within the core. Since nuclear fissions are induced by neutrons, it is of primary importance the determination of: •the neutron-nuclear reaction probabilities, i.e. the cross sections; •the neutron density in the nuclear reactor core.



The deterministic solution of such a complex problem is addressed in two steps.



Lattice Code

In a lattice code, an accurate discrete representation of a relatively small core pattern the fuel assembly - is carried out. Within this domain, the Boltzmann Transport equations are

Core Simulator

In a core simulator, the fuel-assembly-averaged parameters are used to build a rough discrete model of the entire core. Within this domain, simpler equations are solved. Radial and axial power distribution can also be reconstruct with high accuracy.



solved in order to calculate the fuel-assemblyaveraged parameters.



Research Line: Uncertainty Propagation

Input quantities as the microscopic cross

sections - as measured quantities - are affected by uncertainties. The propagation of these uncertainties through the model would allow the prediction of the core parameters with their confidence bound.

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