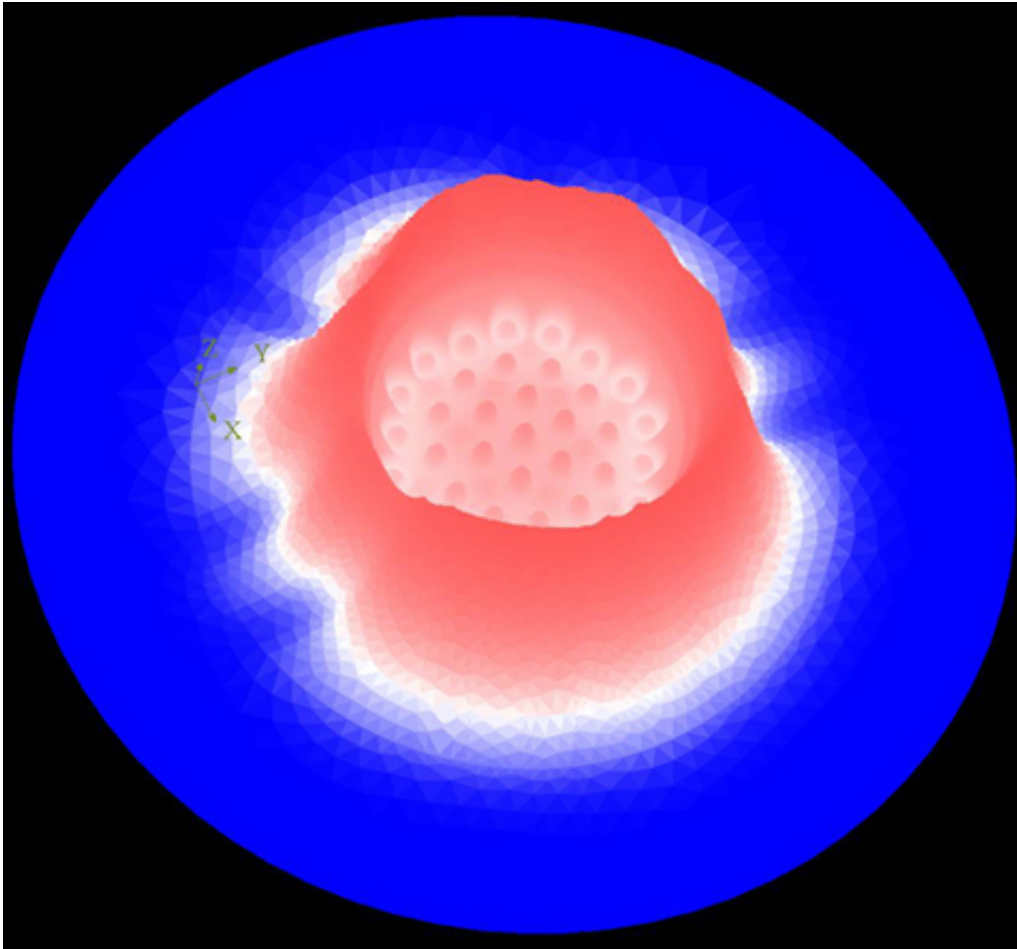


Neutronics for light water reactors: phenomenology

Code référence : 835



OBJECTIFS

Sum up the general knowledge in neutron physics requested for design, operation and safety analysis of light water reactors (LWRs):

- identify and explain all the phenomena resulting from neutron-nucleus interactions related to the nuclear reactor behaviour.

PUBLIC

Professionals working in nuclear industry companies, Technical Safety Organizations (TSO) or regulatory bodies, researchers, students.

PRÉ-REQUIS

Mathematical background, especially differential and integral calculation - common functions.

CONTENU

- Introductory nuclear physics: nucleus properties, radioactivity, nuclear reactions, cross-sections, neutron induced reactions, fission reaction and its characteristics.
- Introduction to neutronics: energy domains, neutron current, flux and spectrum, reaction rates; neutron balance: the four factors formula, leakage...
- Diffusion equation: Fick's law, solution of the diffusion equation, one group diffusion theory, critical conditions, "geometrical buckling".
- Neutron slowing down and thermalization: elastic and inelastic scattering, lethargy, resonance absorption.
- Reactor kinetics: reactivity, prompt and delayed neutrons precursors, Nordheim's equation.
- Temperature and poisoning effects, fuel evolution, Pu recycling.

MÉTHODE

Lectures, exercises. Lab sessions with French computing tools: deterministic code APOLLO2, kinetics and poison softwares.

Maximum number of trainees: 16.

This course includes lab sessions using ionizing radiations and visits of facilities with regulated zones. Please comply with the conditions stated in the terms of sale.

COLLABORATION

Adviser: Cheikh Diop (CEA/DEN/DANS/DM2S/SERMA/DIR)