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LEAD TARGET FOR THE STUDY OF ACCELERATOR DRIVEN SUBCRITICAL REACTOR WITH ION BEAMS

Our studies dedicated to the ADSR subject revealed that ADSR can represent an efficient source of energy, able to ensure a safer exploitation and a deeper burning of the actinides in comparison with a fast reactor (FR). The use of a beryllium converter gives the possibility to obtain with a beam of 7Li with energy 0.25-0.3 AGeV the same net electrical power as the one realized with 1-1.5 GeV proton. With beam intensities above 1016 p/s, energy gain higher than 15 is achieved. The conclusions were obtained through simulations with the code Geant4 and theoretical calculations.
Experimental possibilities to compare the efficiency of different beams are analyzed. The first variant would be the measurements of the neutron yield for various beam-converter combinations. But such experiments are confronted with difficulties related to the measurements of the double differential neutron yield from thick and extended targets. Another problem is created by the fact that it is not a direct correlation between the neutron multiplicity from the converter and the energy released in the reactor core.
The most reliable results can be obtained by measuring the fission distribution inside an extended target. The design of such target is presented. A lead block with dimensions 110x110x150 cm is used as substitute for the lead-bismuth coolant. The target has a central hole for the converter, and holes in horizontal and vertical directions, at different radii for the placement of the detectors. Expected results predicted by simulation for different beams and converter materials are presented.

Section

Energy and materials science (Section 2)

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