

IAF SPACE POWER SYMPOSIUM (C3)
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PRELIMINARY NEUTRONIC CHARACTERIZATION OF A MW CLASS AND LEU SPACE
NUCLEAR REACTOR

Abstract

A preliminary design of a space nuclear reactor, with a power in the range of one MW and based on a Low Enriched Uranium (LEU) fuel and a cooling system relying on Heat Pipes with sodium as coolant, has been carried out and analysed thanks to a full Monte Carlo model. Reactivity control system worth, burnup and shielding and some sensitivity analysis, have been modeled with the MCNP6 code. The reactor should be able to provide approximately 2 MW of thermal energy for ten years. The outcomes emerging from this work have highlighted the potentialities and the neutronic feasibility of the chosen material and technological solutions in terms of system masses, volumes and broad performances. The results of this study will be used to inform the subsequent design steps targeting an optimal configuration satisfying the established requirements.