

CRITICALITY CALCULATIONS IN REACTOR ACCELERATOR COUPLING EXPERIMENT (RACE)

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Abstract

A Reactor Accelerator Coupling Experiment (RACE) is to be performed at the Idaho State University's Idaho Accelerator Center (IAC). The electron accelerator is used to generate neutrons by inducing bremsstrahlung photon-neutron reactions in a Tungsten- Copper target. This accelerator/target system produces a source of $\sim 10^{12}$ n/s, which can initiate fission reactions in the subcritical system. This coupling experiment between a 40-MeV electron accelerator and a subcritical system will allow us to predict and measure coupling efficiency, reactivity, and multiplication. In this paper, the results of the criticality and multiplication calculations, which were carried out using the Monte Carlo radiation transport code MCNPX, for different coupling design options are presented. The fuel plate arrangements and the surrounding tank dimensions have been optimized. Criticality using graphite instead of water for reflector/moderator outside of the core region has been studied. The RACE configuration at the IAC will have a criticality (k -effective) of about 0.92 and a multiplication of about 10.