Contribution ID: **107**　　　　　　　　　　　　　　　　　　Type: **Oral Presentation**

Calculation of the Energy Produced from Radiative Capture in the SAFARI-1 Nuclear Reactor

Thursday, 6 July 2017 11:10 (20 minutes)

The knowledge of the fission Q-value is important for the safety analysis of a nuclear reactor. It is around 200MeV/fission in all nuclear reactors, being the energy released from radiative capture (Qϒc), the main source of differences between reactors. In this work, we present a detailed calculation of Qϒc produced in SAFARI-1 using the MCNP-5 (Monte Carlo N-Particle) code. MCNP is a probabilistic transport code that has the capability of solving general geometries with continuous energy data. In particular, we calculate the reaction rate of the nuclides that contribute majorly to the heating in the SAFARI-1 core. From the nuclear reaction rate and the energy released per reaction (binding energy), the total energy produced from radiative capture was calculated. In previous work, the radiative capture energy was calculated as an energy deposition using MCNP-5. From the energy deposition calculation, Qϒc was calculated as 5.42MeV/fission. Using the energy production method, Qϒc was calculated as 6MeV/fission. Typical values for Qϒc range between 3-12MeV/fission. This work takes a closer look at how to arrive at these values using the two methods in MCNP-5.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Main supervisor (name and email)
and his / her institution

Dr O. M. Zamonsky- oscar.zamonsky@necsa.co.za
NECSA- South African Nuclear Energy Corporation

Would you like to <br> submit a short paper <br> for the Conference
 Proceedings (Yes / No)?

Yes

Primary author:　Ms JURBANDAM, Linina (University of Witwatersrand)

Co-author:　Dr ZAMONSKY, Oscar. M (NECSA)

Presenter:　Ms JURBANDAM, Linina (University of Witwatersrand)

Session Classification:　Nuclear, Particle and Radiation Physics 1