Somayye Seyfi et al., J Nucl Med Radiat Ther 2016, 7:6(Suppl)
http://dx.doi.org/10.4172/2155-9619.C1.009

Nuclear reactor power measurement based on 17O(n,p)17N as a new channel 16

Somayye Seyfi and **Morteza Gharib**
Nuclear Science and Technology Research Institute, Iran

Tehran research reactor (TRR) is a representative of pool type research reactors using light water, as coolant and moderator. This reactor is chosen as a prototype to demonstrate and prove the feasibility of ^{17}N detection as a new redundant channel for reactor power measurement. In TRR, similar to other pool type reactors, neutron detectors are immersed in the pool around the core as the main power measuring devices. In the present article, a different approach, using out of water neutron detector, is employed to measure reactor power. This new method is based on ^{17}O (n,p) ^{17}N reaction taking place inside the core and subsequent measurement of delayed neutrons emitted due to ^{17}N disintegration. Count and measurement of neutrons around outlet water pipe provides a reliable redundant safety channel to measure reactor power. Results compared with other established channels indicate a good agreement and shows a linear interdependency with true thermal power. Safety of reactor operation is improved with installation & use of this new power measuring channel. The new approach may equally serve well as a redundant channel in all other types of reactors having coolant comprised of oxygen in its molecular constituents. Contrary to existing channels, this one is totally out of water and thus is an advantage over current instrumentations. It is proposed to employ the same idea on other reactors (nuclear power plants too) to improve safety criteria.

Recent Publication

1. Somayye Seyfi, Morteza Gharib (2015) A new safety channel based on ^{17}N detection in research reactors, Applied Radiation and Isotopes 104: 1–4.

Biography

Somayye Seyfi has her expertise in Physics and Experimental Nuclear Engineering. During her academic career for obtaining Master of Science degree, she worked in close association with AEOI to look for alternative methods for power evaluations in nuclear reactors. Based on delayed neutron emission from N-17, several experiments were conducted in TRR which finally resulted to a new approach for out-of-core power measurements suitable in all reactors having oxygen as a constituent in moderator.

s.seyfi7@gmail.com

Notes: