월성1호기 핵설계보고서를 이용한 WIMS-AECL 코드평가

Evaluation for the Code WIMS-AECL Using Wolsong-1 Physics Design Manual

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요약

월성 1호기 핵설계보고서의 계산결과를 WIMS-AECL코드를 이용하여 비교, 평가하고, 향후 핵설계 시 WIMS-AECL 코드를 이용한 핵설계 방법론을 구축하고자 하였다. 이에 우선적으로 핵연료 채널내 감속재, 냉각재, 핵연료 온도변화에 따른 반응도 변화효과를 고려하여 계산하였다. 특히 LOCA시 정반응도 주입량 계산에 필수적인 냉각재 기포 변화에 따른 반응도 변화도 계산하였다. 온도나 기포반응도 효과 모두 초기장전 핵연료에서 유사하였으나, 핵연료의 연소가 진행됨에 따라 그 차이가 커졌다.

A Physics Study on the Recycling of Mixed Thorium/Uranium Fuel in a CANDU Reactor by Dry Process Technology

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Abstract

Dry process technology has high proliferation-resistance which can be utilized not only in the existing nuclear system but also in a future nuclear system. In this study, a homogeneous ThO_2-UO_2 fuel cycle option was analyzed for a Canada deuterium uranium (CANDU) reactor based on the dry process to recycle the spent fuel. In order to assess the feasibility of a closed fuel cycle in the CANDU reactor, basic physics parameters such as reactivity coefficients and isotopic content variation were obtained for various fuel conditions. The results of the physics calculations showed that it is feasible to recycle thorium/uranium fuel by the dry process, which in turn significantly reduces the natural uranium consumption. It is, however, required to further investigate a dry process option that is technically feasible for the thorium-abundant dioxide fuel.