

VIPRE 코드 KEPRI Version을 사용한 Vantage 5H 연료 노심에 대한  
노심열수력 모델평가

Evaluation of Core Thermal-hydraulic Model for Vantage 5H Fuel Core  
Using KEPRI Version of VIPRE-01 Code

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요약

본 논문에서는 Vantage 5H 연료를 사용하는 웨스팅하우스형 3 루프 발전소에 대해 개발된 VIPRE KEPRI 버전의 노심열수력 모델 특성과 주요변수에 대해 수행된 민감도 분석 결과가 기술된다. 개발된 모델은 기존의 설계코드인 THINC에 의한 FSAR 결과로 벤치마킹을 수행하였다. 벤치마킹 수행 결과, 본 논문에서 개발된 VIPRE 모델링은 기존의 THINC 코드와 부합함을 확인하였다.

Thermal Hydraulic Analysis of Thorium Fuel Assemblies Loaded  
with Annular Seed Pins

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Abstract

Thermal hydraulic characteristics of thorium-based fuel assemblies loaded with annular seed pins have been analyzed using MATRA\_A combined with MATRA, and compared with those of the existing thorium-based assemblies. MATRA and MATRA\_A showed good agreements for the pressure drops at the internal subchannels. The pressure drop generally increased in the cases of the assemblies loaded with annular seed pins due to the larger wetted perimeter, but an exception existed. In the inner subchannels of the seed pins, mass fluxes were high due to the grid form losses in the outer subchannels. About 43% of the heat generated from the seed pin flowed into the inner subchannel and the rest into the outer subchannel, which implies the inner to outer wall heat flux ratio was approximately 1.2. The maximum temperatures of the annular seed pins were slightly above 500°C. The MDNBRs of the assemblies loaded with annular seed pins were higher than those of the existing assemblies. Due to the fact that interchannel mixing cannot occur in the inner subchannels, temperatures and enthalpies were higher in the inner subchannels.