Thermal Margin Model for Transition Core of KSNP

Kee-Yil Nahm, Jong-Seon Lim, Sung-Kew Park,
Chong-Kuk Chun, and Sun-Tack Hwang

Korea Nuclear Fuel Co., Ltd.
493, Dukjin-Dong, Yusong-Gu, Daejeon

Abstract

The PLUS7 fuel was developed with mixing vane grids for KSNP. For the transition core partly loaded with the PLUS7 fuels, the procedure to set up the optimum thermal margin model of the transition core was suggested by introducing AOPM concept into the screening method which determines the limiting assembly. According to the procedure, the optimum thermal margin model of the first transition core was set up by using a part of nuclear data for the first transition and the homogeneous core with PLUS7 fuels. The generic thermal margin model of PLUS7 fuel was generated with the AOPM of 138%. The overpower penalties on the first transition core were calculated to be 1.0 and 0.98 on the limiting assembly and the generic thermal margin model, respectively. It is not usual case to impose the overpower penalty on reload cores. It is considered that the lack of channel flow due to the difference of pressure drop between PLUS7 and STD fuels results in the decrease of DNBR. The AOPM of the first transition core is evaluated to be about 135% by using the optimum generic thermal margin model which involves the generic thermal margin model and the total overpower penalty. The STD fuel is not included among limiting assembly candidates in the second transition core, because they have much lower pin power than PLUS7 fuels. The reduced number of STD fuels near the limiting assembly results in decreasing the loss of flow from the limiting assembly to increase the thermal margin for the second transition core. It is expected that cycle specific overpower penalties increases the thermal margin for the transition core. Using the procedure to set up the optimum thermal margin model makes sure that the enhanced thermal margin of PLUS7 fuel can be sufficiently applied to not only the homogeneous core but also the transition core.