

부분충수 배관유동에서 수력점프의 위치를 예측하는 단순모델 서재광[†] · 유승엽* · 윤주현* · 지성균*(KAERI)

A Simple Model to Predict the Hydraulic Jump Location in a Not Fully Filled Horizontal Pipe Flow
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Key Words: Hydraulic Jump(수력점프), Not Fully Filled Pipe Flow(부분충수 배관유동), Mid-Loop Operation(부분충수운전)

Abstract : Hydraulic jump is a local nonuniform flow phenomenon which occurs when the supercritical flow decelerates to a subcritical flow. It may be seen from a not fully filled pipe flow equation that when the Froude number of the fluid approaches unity with a value greater than 1, the differential variation of the fluid level in the direction of the flow becomes infinity. The result, then, is a marked discontinuity on the surface, characterized by the steep upward slope of the profile. In this study, a simple concept where the excessive energy of the supercritical flow is set equal to the energy dissipated by the wall friction is suggested to predict the location of the jump in a pipe flow. Then the location of the jump is simply determined by using the Manning formula. The feasibility of this concept is confirmed indirectly through an evaluation of the water level distribution of the reactor coolant during a mid-loop operation in a real reactor plant.

핵연료시험설비의 첨두핵연료피복재온도에 대한 운전변수의 영향

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Effects of Operation Parameters on the Peak Cladding Temperature for the Fuel Test Loop

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Key Words: Fuel Test Loop(핵연료시험설비), Peak Cladding Temperature(첨두핵연료피복재)

Abstract : The fuel test loop of HANARO has been modeled with MARS code to predict the peak cladding temperature (PCT) which is one of the design criteria for the design basis accidents. The PCTs have been calculated in the various operation parameters such as mass flow rate, coolant temperature, system pressure, the thermal power of test fuel, and the valves of safety function. In case of the room 1 LOCA the PCT increases with the increase of the thermal power, the coolant temperature, and the stroke time of the cold leg loop isolation valves as compared with that calculated in the design operation condition. However the effect of the stroke times of the safety injection valves and the depressurization valves on the PCT is negligible.