

The Model Establishment and Analysis of TRACE/FRAPTRAN for Chinshan Nuclear Power Plant Spent Fuel Pool

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Abstract : TRACE is developed by U.S. NRC for the nuclear power plants (NPPs) safety analysis. We focus on the establishment and application of TRACE/FRAPTRAN/SNAP models for Chinshan NPP (BWR/4) spent fuel pool in this research. The geometry is 12.17 m \times 7.87 m \times 11.61 m for the spent fuel pool. In this study, there are three TRACE/SNAP models: one-channel, two-channel, and multi-channel TRACE/SNAP model. Additionally, the cooling system failure of the spent fuel pool was simulated and analyzed by using the above models. According to the analysis results, the peak cladding temperature response was more accurate in the multi-channel TRACE/SNAP model. The results depicted that the uncovering of the fuels occurred at 2.7 day after the cooling system failed. In order to estimate the detailed fuel rods performance, FRAPTRAN code was used in this research. According to the results of FRAPTRAN, the highest cladding temperature located on the node 21 of the fuel rod (the highest node at node 23) and the cladding burst roughly after 3.7 day.

Keywords : TRACE, FRAPTRAN, BWR, spent fuel pool

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