

Development of an Automated Operating Procedure System
using Fuzzy Colored Petri Nets for Nuclear Power Plants

Seung Jun Lee and Poong Hyun Seong
Korea Advanced Institute of Science and Technology
Department of Nuclear Engineering
373-1 Guseong-dong, Yuseong-gu
Daejeon, Korea 305-701

Abstract

In this work, AuTomed Operating Procedure System (ATOPS) is developed. ATOPS is an automation system for operation of a nuclear power plant (NPP) which can monitor signals, diagnose statuses, and generate control actions according to corresponding operating procedures, without any human operator's help. Main functions of ATOPS are anomaly detection function and procedure execution function, but only the procedure execution function is implemented because this work is just the first step. In the procedure execution function, operating procedures of NPP are analyzed and modeled using Fuzzy Colored Petri Nets (FCPN), and executed depending on decision making of the inference engine. In this work, an ATOPS prototype is developed in order to demonstrate its feasibility and it is also validated using FISA-2/WS simulator. The validation is performed for the cases of a loss of coolant accident (LOCA) and a steam generator tube rupture (SGTR). The simulation results show that ATOPS works correctly in the emergency situations.