Keoni Sanny, Claudia Picoco, Tunc Aldemir
Ohio State University

2019 International Topical Meeting on
Probabilistic Safety Assessment and Analysis

Dynamic Probabilistic Risk Assessment with PyCATSHOO:
The Case of the Emergency Power Supply of a Nuclear Power Plant

Component recoveries and system reconfigurations cannot be fully treated by static methods such as the traditional event-tree (ET)/fault-tree (FT) approach, since times of occurrence of events are not explicitly considered. Dynamic approaches (and tools), also known as Dynamic Probabilistic Risk Assessment (DPRA) methodologies, are able to overcome and solve this major limitation. In this context, PyCATSHOO software has been developed by the Électricité de France research and development team, as a DPRA tool that aims to overcome the shortcomings of the static ET/FT approach. PyCATSHOO explicitly accounts for the time of occurrence of events, and allows for component recoveries and system reconfigurations. By implementing the concept of Piecewise Deterministic Markov Process, it models both deterministic continuous phenomena (described by a set of differential equations) and stochastic discrete events. In this paper, the application of the PyCATSHOO software is introduced for a simplified AC power system, as well as for a nuclear power plant's emergency power supply system (EPSS). The EPSS was previously established as a benchmark for dependability assessment techniques applied to dynamic stochastic systems. The results previously obtained in the benchmark have been used to validate the PyCATSHOO model.