

Reliability Study of the AP1000 Passive Safety System by Fuzzy Approach

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20436201&lokasi=lokal>

Abstrak

The Westinghouse AP1000 is a new design nuclear power plant which has implemented the concept of passive system. Even though a passive system may be more reliable than an active one, the possibility of the passive system to fail still exists. In line with this possibility, generic database have been used to study the reliability of the AP1000 passive safety system. However, since the used data are not specific to the AP1000, the results of the analysis will not show its real performance. This study proposes a fuzzy reliability approach to overcome this problem. The proposed fuzzy reliability approach utilizes the concept of failure possibility to qualitatively describe basic event likely occurrences and membership functions of triangular fuzzy numbers to quantitatively represent qualitative failure possibilities. A case-based experiment on reliability study of the AP1000 passive safety system involved to mitigate a large break loss of collant accident is used to validate the feasibility of the proposed approach. By comparisons, probabilities of basic events generated by the proposed approach are very close to the ones which have been used by previous reliability studies. This can be observed from the small numbers of relative errors, i.e. between 0.004125 and 0.079635. These results confirm that the fuzzy reliability approach offers a more realistic technique to study the reliability of the AP1000 passive safety system without the need to engage to precise probability distributions of its components which are currently unavailable.