

5. Conclusion

This paper presents an approach for availability modeling of a PSV, where adverse impact of periodic testing is examined. A multi-phase Markov approach is used to explicitly model the leakage resulting from isolation and reinstatement activities, as well as the imperfect testing and repair. Moreover, analytical formulas are developed to calculate the state probabilities of the multi-phase Markov model. The numerical results of the formulas are used to estimate the PFD_{avg} of the PSV function and the frequency of test-induced leaks. The case study shows that the frequency of unwanted leaks can be reduced significantly by extending the test interval, while meeting the desired PFD_{avg} of the PSV function. The suggested approach represents a useful extension of availability modeling, which may be used to support decision-making about the optimal function testing interval for a periodically tested safety barrier.

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