A Dynamic Fault Tree Analysis Model

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Abstract

In this paper a model for dynamic fault tree (FT) analysis is developed. The model is ussed for the analysis of a cold standby redundant system.
It is shown that a typical modern fault tree analysis (FTA), resulting in the Boolean domain in a short pseudo-polynomial, i.e., a polynomial in the literals of the FT input variables, can yield grave errors in case of cold standby, even though the single terms are apparently evaluated correctly via convolution. Expanding the FT terms to minterms gives correct results, yet with considerable computational effort. Hence, here the FT is transformed to a special syntax tree based mainly on dual functions and on convolution which can be readily evaluated to give (strict sense) system reliability.

Keywords: *Reliability, Fault Tree, Fault Tree Analysis, Minterm, Syntax tree, Cold Standby Redundancy, Convolution, Dual function, Priority AND.*