

Dynamic Fault Tree Analysis for Multi-Level Cold Standby

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Abstract

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 $X_1, \bar{X}_1, X_2, \bar{X}_2, \dots$, 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: *Fault tree, Minterm, Syntax tree, Cold Standby, Convolution, Dual function, Priority AND.*