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Variable ordering schemes to apply to the binary decision diagram methodology for event tree sequences assessment

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Abstract— Binary decision diagram (BDD) methodology is the most recent approach to improve Boolean reliability models assessment. The final size of the BDD, and therefore the ultimate benefits of this technique, are very sensitive to the initial variable ordering that has to be fixed prior to conversion. Several variable ordering strategies have been proposed in the literature, all of them focused on the treatment of single fault tree models. This paper proposes some extensions of existing variable ordering schemes for the case of combinations of non-disjoint fault trees, as is the case in quantifying sequences of event trees. These extensions work by combining ordering schemes applied to each fault tree, and exploring the cases where variables within the domains intersection are kept together or not. They have been specifically designed to be applied together with an incremental procedure to compute the BDD of the sequence accumulatively and to be used to quantify sequences of dynamic event trees. Preliminary results show the potential of this approach.

Index Terms— Probabilistic risk assessment, event tree analysis, binary decision diagrams, variable ordering heuristics

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