New Algorithm to Segment Combinational Circuits in Pseudo-Exhaustive Testing

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Abstract

In pseudo-exhaustive testing, the circuit is segmented into m output cones, and each outâput cone is exhaustively tested. The test ensures detection of all detectable faults within the individual output cones of the circuit without the need for the fault simulaâtion. The use of pseudo-exhaustive testing is associated with certain costs. It includes the hardware cost of inserting segmentation cells to segment the circuit. In this paper, a new algorithm to segment combinational circuits is presented to reduce the hardware cost of inserting segmentation cells. In this algorithm, several heuristic procedures are proposed to handle different circuit topologies. The concept of limited global effect is presented. The limited global effect is to study the effect of a candidate node with respect to a particular subset of the nodes in its fan-out cone (FOC). Several approaches for the selection of the candidate nodes are presented, also. The experimental results for all combinational ISCAS85 benchmark circuits (F. Brglez, 1985) indicate the superiority of the presented algorithm in this paper with respect to all previous published algoârithms. Using the presented algorithm, no deviation of the number of segmentation cells from the expected behavâiour for all cone size reduction values of all combinational ISCAS85 benchmark circuits between 16 to 32 is achieved - another improvement over previously published algorithms.

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