New Test Pattern Generators for the BIST Pseudo-Exhaustive Testing based on Coding Theory Principles

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Abstract

In this paper, an efficient algorithm to design convolved LFSR/SR (Linear Feedback Shift Register / Shift Register) for the pseudo-exhaustive testing (PET) is presented as far as the lengths of the test set and hardware overhead are concerning. In this algorithm, an efficient search to reduce the constraint in the size of the shift register (SR) segment and makes an effiâcient search to restrict on the number of feed forward stages into two stages at most and no restriction on the size of the SR segment. The residues are assigned such that minimum hardware overhead is achieved. This search generates several possible solutions for each case, from which the minimal hardware solutions may be chosen. In addition, a new test pattern generator (TPG) for the PET that bridges the gap between convolved LFSR/SR and permuted LFSR/SR is presented. It is considered to be the optiâmal pseudo-exhaustive test pattern generator (PETPG) as far as the lengths of the test set and hardware overhead are concerning. An efficient residue assignment for the inâputs of the CUT to reduce the hardware overhead is presented. With small number of permutations in the assigned residues, the chance of obtaining efficient solutions may be increased. The presented generator in this paper is considered the general form of the PETPG. The simple LFSR/SR, the permuted LFSR/SR, and convolved LFSR/SR are considered the special case. The experimental results for all combinational benchmark circuits [1] indicate the superiority of the presented approach with respect to previous published works.

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