

TopMatch: A Monte Carlo method for mismatch analysis in integrated circuits

This technology offers a breakthrough solution to variation and mismatch analysis of complex integrated circuits. The amount of required computational resource is currently prohibitive in the design flow of many real-world circuits with a huge amount of elements. TopMatch reduces the required simulation time significantly and enables performing analyses that are currently not affordable.

BACKGROUND

Manufacturing variation (MV) is nowadays causing annual losses of billions of dollars in integrated circuit (IC) design and development. MV is getting increasingly important and difficult to capture. Therefore, the requirements of variability-aware design raise new concepts and challenges to both design and design automation of integrated circuits and systems where EDA (Electronic Design Automation) is becoming more and more important. A common method to understand the effect of variations on the performance of integrated circuits is Monte Carlo (MC) simulation. However, MC simulation can be very expensive when the required number of MC samples needs a massive amount of computational resource. Therefore, performing variation analysis or performance modeling with as few MC samples as possible has become a prominent target.

TECHNOLOGY

TopMatch is an effective method for detecting the mismatched components (e.g. transistors or circuit blocks like the one in Fig. 1), which have the strongest influence on the performance of an integrated circuit or system with a massive number of components. It enables more accurate variation analysis and performance modeling with less Monte Carlo runs compared to the existing methods and can verify the circuits against mismatch or manufacturing variations considerably faster than conventional tools.

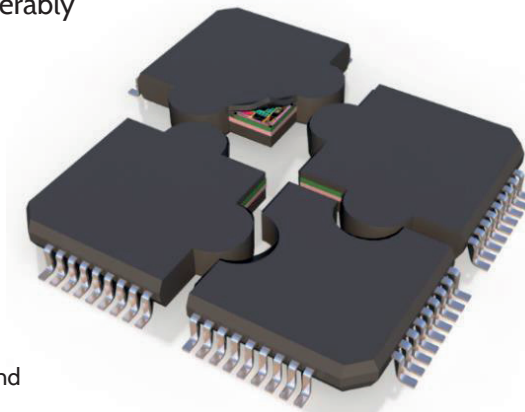


Fig 1: Mismatch can be brought to light and analyzed using TopMatch.

ADVANTAGES

- Reducing Monte Carlo simulation time strongly
- Providing higher levels of confidence to the design
- Easy integration in SPICE-class or similar EDA tools
- A complement to existing “fast” Monte Carlo schemes
- Paving the way towards more intelligent design and characterization software

REFERENCE:
M052/2017

APPLICATIONS:
Mismatch analysis and design verification of integrated circuits

DEVELOPMENT STATUS:
Spectre-MATLAB proof of concept

KEYWORDS:
Electronic Design, Automation, Manufacturing Variations, Monte Carlo simulation, Variation and mismatch analysis

IPR:
EP and US patent application filed

OPTIONS:
■ R&D - Cooperation
■ License Agreement
■ Patent sale

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