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AFTU, an Analog single event effects automatic analysis tool

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AFTU is an End-User Development (EDU) software tool for the analysis of Single Event Effects on microelectronic designs. AFTU takes user inputs as the design netlist, VLSI technology type, injection points and analysis heuristics classes to generate an expert software with two main functions: management of a simulation set through Spectre and a heuristic-based inference engine to classify and analyze the simulation set results. The actual AFTU 1.0 simulates single event effects through current injection models.

We present the AFTU tool chain, comprising a user interface, a full compiler from user input to code generator in SKILL language and an end analysis presentation file. The output code is the expert software, to be interpreted by Cadence OCEAN. The process simulation flow, commanded by the expert software, generates a set of simulations of the microelectronic design under several SEE situations, coded as injection models, in different design elements. The simulation set results are organized by the inference engine and selected under heuristic based inferences, in order to present a SEE vulnerability assessment file to the microelectronics designer.

For illustration of AFTU capabilities, we present two case studies. First one is a Single Event Transient analysis on a Op-Amp in voltage follower configuration. Second one is a Single Event Upset analysis of a basic Finite State Machine. Both designs are implemented in ST Microelectronics 130 nm technology. In each case there is a specific heuristic, showing the tool versatility. Future improvements are also discussed.

Primary author: Mr MÁRQUEZ, Fernando (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain)

Co-authors: Dr PALOMO PINTO, Fco. Rogelio (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain); Dr MUÑOZ CHAVERO, Fernando (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain); Mr SÁNZ, Luis (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain); Dr AGUIRRE ECHÁNOVE, Miguel A. (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain)

Presenter: Dr PALOMO PINTO, Fco. Rogelio (Electronic Engineering Dept., Higher Technical School of Engineering, Sevilla University, Spain)

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