Preface

This book is the 11th in a series of books comprising extended versions of the best papers presented at the Forum for Specification and Design Languages (FDL). FDL is a well established international conference devoted to dissemination of research results, and new ideas in the design, modelling and verification of integrated circuits, complex hardware/software embedded systems, and mixed-technology systems. This book presents a selection of papers from FDL'2010 which was held in Southampton, UK, September 14–16, 2010 and was the 13th FDL conference following a series of highly successful events that took place in Lausanne, Lyon, Tbingen, Marseille, Frankfurt am Main, Lille, Darmstadt, Barcelona, Stuttgart and Sophia Antipolis. FDL is organized in technical cooperation with the IEEE and IEEE Computer Society Technical Committee on Design Automation (TCDA) and IET in the UK.

In this volume the reader will find contributions from all the four Thematic Areas of FDL:

1. Assertion Based Design, Verification and Debug (ABD)
2. Embedded Analog and Mixed-Signal System Design (EAMS)
3. Language-Based System Design (LBSD)
4. UML and MDE for Embedded System Specification and Design (UMES)

Chapters 1–3 belong to the ABD Thematic Area (TA) and concern aspects of formal property expression and processing, with an emphasis on design levels, verification, automatic synthesis and mechanized debug aids. The assertion of formal properties provides a uniform expression of expected system behaviour, or environment constraints for a variety of design tasks such as verification of functional correctness, generation of test stimuli, synthesis of observation monitors and on-line tests, model checking on the reachable state space and direct synthesis from assertions.

Chapters 4–7 treat various research directions in the area of embedded analog, mixed-signal and mixed-technology system design (EAMS Thematic Area). They discuss issues related to specification, modelling, simulation, symbolic and numerical analysis, virtual and industrial prototyping, as well as synthesis of analog,

mixed-signal, and mixed-technology systems. The EAMS Thematic Area focuses on languages, models, and mixed-signal tools such as VHDL-AMS, Verilog-AMS, SystemC-AMS, Modelica, Matlab/Simulink and others. New challenges include distributed models of mechanical components in mixed-physical-domain systems and tight interaction between analogue components and digital hardware/software systems modeled on high levels of abstraction.

Chapters 8–13 address language-based modelling and design techniques for simulation, debugging, transformation, and analysis of hardware/software embedded systems (LBSD Thematic Area). Here prominence is given to C/C++ based design methodologies which are now entering productive industrial design flows especially after the IEEE standardization of SystemC. Hence, the lion share of contributions to this topic is related to SystemC and its extensions. Research topics covered by these contributions include techniques for embedded software modelling techniques and technology or domain specific approaches. New mechanisms for high abstraction levels such as transaction level modelling (TLM) or IP-XACT and their implications on IP-based system design or system synthesis are examples of important challenges in this area.

The final two chapters are extended versions of contributions presented in the UMES Thematic Area. They concern formal foundations for the interoperability between MARTE and SystemC as well as models of data dependencies supported by multi-dimensional synchronous data flow. Model driven methods are increasingly used to support semi-formal approaches to system level design of complex embedded systems including highly programmable platforms and heterogeneous Systems-on-Chip.

We hope that readers from both academia and industry will find the contributions presented here of interest and relevant to their research work in the field of electronic design automation.

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