



## Editorial

The papers in this issue are revised and extended versions of communications presented at the *Third International Conference on Algebraic Methodology and Software Technology*, held on June 21–25, 1993, at the University of Twente, Enschede, The Netherlands.

Objectives of the conference were:

- (1) to consolidate and expand the trend created by the international dialogue established by the previous two AMAST conferences,
- (2) to make a new step toward transforming algebraic methodology into software technology,
- (3) to promote the mathematical education of software developers.

The topics of the invited papers and selected communications presented at the conference cover both theory and practice and span a wide variety of algebraic and software development issues, including: algebraic metamathematics, functional programming, relation algebra, order-sorted algebra, category theory in software engineering, modular system design, real-time system specification, testing theory and applications, algebraic semantics of concurrency, process algebra, modal logics and reactive systems, design and refinement principles, object-oriented design and programming, equational and logic programming, algebraic specification in software engineering.

The interest in showcasing software systems that have been developed using algebraic methods, techniques, and tools was incorporated in the AMAST'93 program by a few demonstrations of software systems.

A twofold result was expected from AMAST'93: a new stage of integration between research in software development and mathematics of software objects, and new steps towards the mathematics of program development as well as towards models of computation that fit the new developments in hardware.

Four main reasons justify the positive assessment of the extent to which the expected objectives and results were achieved by AMAST'93:

- (1) the high quality of the contributions, measured by their originality, soundness, clarity, and relevance to the aims of the conference;
- (2) the widening of the software technology spectrum where the potential of using algebraic methods has been shown useful;
- (3) the establishment of the mathematical education of software developers as a continuing interest of the AMAST community;
- (4) the growth of the international spread of the AMAST community.

Of the 121 papers submitted to AMAST'93, 32 were selected for presentation at the conference. Short, preliminary versions of the selected communications together with 8 invited papers and 6 short descriptions of software systems were included in the participants' proceedings. A second review and further revision of those papers took place soon after the conference, and yielded the AMAST'93 Proceedings, published by Springer-Verlag, London, in the *Workshops in Computing* series. Nine of the selected communications, in extended form, were submitted for publication in *Theoretical Computer Science*. Two of these papers were submitted for publication in regular issues, while the other seven were reviewed for this special issue.

The six papers selected for this issue testify to the successful achievement of the objectives of the conference. The topics they address are diverse; the approaches, problems, and results they propose are novel and, though seemingly unconnected, together they yield a coherent enrichment of the potential of using algebraic methods in the science and technology of computing.

In this issue, D. Pigozzi and A. Salibra, in the article *Lambda abstraction algebras: representation theorems*, investigate the representation theory of the algebraization of the type-free lambda calculus. They define several classes of lambda abstraction algebras, reveal deep connections between them, and open new problems.

F. Laroussinie, S. Pinchinat and Ph. Schnoebelen, in the article *Translations between modal logics of reactive systems*, establish interesting results about modal logics. The main interest of their results lies in the fact that all the three modal logics which they refer to, are in full agreement with branching bisimulation semantics and are shown to have the same expressive power.

R. Gorrieri, M. Roccetti and E. Stancampiano, in the article *A theory of processes with durational actions*, explore the adoption of algebraic methods as tools for the design and performance analysis of concurrent systems. They introduce a new bisimulation-based semantics, called performance equivalence, relate it to true concurrency semantics, and present us with an open problem.

A. Mokkedem and D. Mery, in the article *On using temporal logic for refinement and compositional verification of concurrent systems*, aim at providing the reader with a complete methodology for the compositional specification, verification and development of concurrent systems. To this purpose, they refine the classical temporal logic to a modular temporal logic, where abstraction, composition and refinement are taken into full account, and show how to derive a compositional proof system for that logic.

M. Navarro, F. Orejas and A. Sanchez, in the article *On the correctness of modular systems*, address the algebraic development of modular systems by introducing an abstract framework which allows one to deal with incompletely specified systems, hence to integrate specification and program design.

Finally, E.G. Wagner, in the article *On the role of memory in object-based and object-oriented languages*, continues to develop his category-theoretic framework for object-oriented languages. The author argues that the proper context for dealing with many aspects of object-oriented programming is imperative, whence his framework is built on a memory model.

We conclude with acknowledgements to those institutions and people who made AMAST'93 and this special issue possible.

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Our final words of thanks are addressed to the authors and the referees, for their remarkable efforts towards meeting difficult deadlines and stringent quality requirements, and to M. Nivat, Editor-in-Chief of *Theoretical Computer Science*, for his continuing support to bringing the AMAST ideas to light.

G. SCOLLO and T. RUS

*Guest Editors*