# Foreword

This special issue is mainly constituted from lectures and talks given at *Machines et Calcul Universels/Universal Machines and Computations* Second International Colloquium, *MCU'98*, held at Metz, Institut Universitaire de Technologie of Metz, March 23–27, 1998. This four day conference, attented by 70 people, was funded by 10 research and public French institutions and received CNRS and IFIP sponsorship. It continues the cycle of conferences set up by *MCU'95* in Paris on the same topics, giving rise to special issue *168-2* of TCS.

Twenty-eight talks were given at *MCU'98*: half of them by invited speakers, the second half after selection of submitted papers. A new process of selection took place leading to the eleven papers of this volume.

The present volume topics deal mainly with decidability/undecidability problems in computer science considered within the frame of both *discrete* and *analog* computations and machine modellings. Many results have been produced since the first edition of *MCU* conferences. Also, Păun–Rozenberg–Salomaa paper of *168-2* TCS issue played a great rôle in the development of molecular computations, especially DNA computations. This can be seen in the present volume where three papers are inspired by that new trend, in particular a paper by Gheorghe Păun. Another one by Lila Kari et al. on the contribution of DNA computation for solving hard problems indicates a direction in which many researchers are presently involved.

Other papers deal with decidability problems in formal language problems, and it is a great pleasure to present here Géraud Sénizergues paper on the decidability of $L(A) = L(B)$ for deterministic algebraic languages.

Three papers belong to studies in the frame of analog computations, a new world beyond the barrier of the Turing machine halting problem. Various classes of such computations are studied, pointing, in particular, on the rich structure of the complexity classes that can be defined in that new setting.

A survey by the guest editor takes stock of the researches for finding the frontier between decidable and undecidable halting problems. It also tries to closer investigate that frontier in the case of deterministic Turing machines with a single head and a single bi-infinite tape, sometimes called *classical* Turing machines.

*MCU* conferences used also to deal with very small universal objects. *MCU'98* does not fail to that tradition and the paper by Katsunobu Imai and Kenichi Morita magnificently illustrates that point by a two-dimensional universal reversible cellular automaton with eight states, working on a triangular grid.

*MCU'98* was vividly witnessing the fact that the study of the frontier between decidability and undecidability draws more and more researchers. Its success is indeed based on the successes reached in that field. I take the occasion of this issue to thank again CNRS and IFIP for sponsoring the conference as well as the members of my program committee who could attend its working: Volker Diekert, Zoltan Ésik, Serge Grigorieff, Jozef Gruska, Giancarlo Mauri, Kenichi Morita and Yurii Rogozhin.

I am particularly thankful to Maurice Nivat for giving me the task of editing this TCS issue on *MCU'98* topics. I am most indebt to referees who did their difficult selection and critical work in a very efficient way. I hope the reader will be pleased by the results presented in this paper. I hope that this volume will bring him/her inspiring thoughts for his/her own reflections.

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