Preface

It is our great pleasure to release this special issue: state of the art in self-validating numerical computations. The methods for self-validating numerical computations have a history of half a century, with remarkable progresses in recent years. Their importance has also been recognized universally. We hope this special issue will help to understand the current status of this area. On behalf of the editorial board of JJIAM, we express our sincere thanks to guest editors, Professor Mitsuhiro T. NAKAO of Kyushu University and Professor Shin'ichi OISHI of Waseda University who first proposed this special issue and have acted as a linker between the authors and the JJIAM editorial board.

Masaaki SUGIHARA
Area ⟨2⟩ Area Editor

Guest Editors' Preface

It is just fifty years since the late Japanese Professor Teruo SUNAGA first published in Japan the paper on the interval analysis, which is arguably the origin of today's self-validating numerical method. The role of self-validating method has become increasingly important today and is essential not only for estimating the rounding errors in numerical computations but also as a technique for rigorously proving the existence and/or uniqueness of the solution for mathematical problems, such as nonlinear equations, differential equations and so on. In addition, Japanese researchers have made a strong contribution in this field to date. This special issue of the Japan Journal of Industrial and Applied Mathematics is planned to publish highly qualified original papers as well as excellent survey papers authored by those who are working in the forefront of this subject.

The volume contains 20 articles consisting of 9 original and 11 survey papers from the following subjects: fundamental arithmetic, linear and nonlinear equations, ordinary differential equations, partial differential equations, optimization, applications to electrical circuit and computational geometry. Particularly, it includes a reprinted version of Sunaga's original paper published in 1958, which seems to be not so easy to find today. Therefore, we believe it should be interesting and useful for the broad scope of readers. As it is important for the future fusion of the verification method combining numerical computation with symbolic manipulation, a survey paper on computer algebra is also included in this journal. Therefore, this issue will help a reader grasp the state of the art and explore the future direction of this research field.