Dear Colleagues:

We now present the first issue of the journal *Reliable Computing*. It isn't actually a completely new publication, since we have used the experience, traditions, and professional links of the journal *Interval Computations*, published since 1991. Fourteen issues of *Interval Computations* have been published; the journal has gained popularity in the professional community, and is now proud to have readers in about 30 countries.

However, scientific life is never stagnant, and the scope of the published material has been gradually extending beyond the topics implied by the former title. The interval approach is actually one of the most important, but far from the only means of obtaining reliable results in mathematical computations. Reliability can also be based on other approaches—both purely mathematical ones and those pertaining to computer tools for solving mathematical problems. The problem of reliability involves issues of well-posedness of computational problems, of providing links between numerical computations and analytic (symbolic) transformations, of choosing the proper machine architecture to allow obtaining the desired result with acceptable resource expenditures, of expressive language constructs for programming the algorithms, etc.

According to the dictionary, *reliable* means dependable, that which may be relied upon. When applied to mathematical computations, reliability suggests guaranteed fulfillment of certain conditions by either the process of obtaining the result or by the result itself. Conditions pertaining to a process include finiteness, convergence, speed, stability, etc. For a result, the condition to be fulfilled may be its membership in a class of mathematical objects, its "place" (localization) within this class, existence of links to other objects, etc. The very list of these conditions may present an interesting topic for further investigations.

Undoubtedly, the most important aspect of reliability in mathematical computations is the connection between "ideal" entities of the "continual world", in terms of which the algorithms are initially formulated, and the "real", finitely representable objects of the computer, "ones-and-zeroes" world within which these algorithms actually operate. Finite representations of numbers, functions, and other mathematical objects, describing algorithms constructively—these problems also belong to the field of reliability, since a neglecting the correctness of mapping the ideal entities into their finite representation inevitably implies unreliability for the entire computation.

It is not unlikely that, in implementing the concepts of reliability in the numerical part of computations, the most prominent role belongs to the achievements of interval mathematics. Indeed, a correct interval computation will guarantee fulfillment of the most important conditions of a numerical solution and, first of all, its localization. Unfortunately, the links of interval mathematics with the methods of analytic transformations (which are usually finite by their nature) are still underdeveloped.

Presently, most of the calculations performed worldwide cannot be considered reliable, since the methods of supplying reliability have not yet received wide acceptance. After performing traditional calculations, users are most often unaware of many important properties of the results so obtained, including their accuracy.

Recognition of the above trends was the main reason for changing the coverage of our journal from that of the former *Interval Computations*. We are now planning to focus not just on a tool (interval approach), but on the ultimate objective—reliability of computations. It is worth noting that one of the first scientists to practice such a transition in his publications

and organizational activity was the founder of interval mathematics, Professor R. E. Moore. It is demonstrative that the workshop he organized back in 1987 was entitled "Reliability in Computing: The Role of Interval Methods," i.e. the objective was given the primary place.

A similar trend can be observed more recently in the articles submitted to *Interval Computations*. During the last two years we have received an increasing number of works dedicated to areas adjacent to interval mathematics or even to areas having no relation at all to interval problems. However, these works have gained certain interest in our readership, since they are, in one way or the other, connected with problems of reliability. Of special importance for our decision to expand the journal's coverage are the international conferences on interdisciplinary links to interval mathematics.

Undoubtedly, interval mathematics will continue to be the foundation of our journal's scope. We will also pay significant attention to applications of interval methods in such areas, traditional in this respect, as the theory of automatic control and mathematical statistics. On the other hand, we also published such materials in the old journal, from its inception.

Reliable computing is impossible without corresponding language constructs, as well as software and hardware tools. We hope that there will be articles and issues dedicated to such tools among our future publications.

In 1995 we are planning to produce 4 issues of the journal. As you can see, the design of the journal has undergone significant changes, which our readers will hopefully approve. The amount of material per issue is the same, but will probably be increased in the future. The Editorial Board is also unchanged, although we plan to recruit several new members.

More specifically, at least two issues in 1995 will be special. One of these will be devoted to parallel algorithms for interval computations, and will thus present a direct sequel to the special issue No 3, 1994, of *Interval Computations*. The second special issue will contain the Proceedings of the "Interval'94" conference which was held in the spring of 1994 in St.Petersburg.

In the present issue, besides current publications, you will find three articles taken from the forthcoming special issues. The reason for this is the desire to make the size of all issues equal, as well as to expedite publishing of works that have already been accepted. The article by C. Jäger and D. Ratz, "A combined method for enclosing all solutions of nonlinear systems of polynomial equations," is borrowed from the issue containing students' papers, and the articles by J. Eriksson and P. Lindström, "A parallel interval method implementation for global optimization using dynamic load balancing," and by D. Cooke, "An informal introduction to a high level language with applications to interval mathematics," are from the special issue on parallel algorithms.

The new journal, as its predecessor, is sponsored by Institute of New Technologies in Education. The director of the Institute, Professor A. L. Semenov, has already contributed, and continues to contribute much to the secure existence of our journal.

In conclusion, we would like to express our hope that most readers will receive the changes positively, and that our readership will increase. We will be grateful for any comments and suggestions.

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