Hardware and Software Support for Interval Arithmetic in the Past and in the Future

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Interval Mathematics has been developed to a high standard during the last few decades. It provides methods which deliver results with guarantees. However, the arithmetic available on existing processors makes these methods extremely slow. As a result they are not widely used in the scientific computing community as a whole. Three things are necessary to enhance the acceptance of interval mathematics: More sophisticated programming environments, better hardware support for interval arithmetic, and more and better education.

The talk will show that on super scalar processors interval operations can be made as fast as simple floating-point operations with only modest hardware costs.

The talk will briefly sketch the programming environments that have been developed at the author's institute since 1966. They are aiming to obtain highly accurate and guaranteed results. Then the talk will show that on super scalar processors interval operations can be made as fast as simple floating-point operations with only modest hardware costs.

For further details see the paper: "Advanced Arithmetic for the Digital Computer – Design of Arithmetic Units",
`ftp://ftp.iam.uni-karlsruhe.de/pub/documents/kulisch/tsukuba.ps.gz`