
The MPFI Library: Towards IEEE 1788-2015 Compliance

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The IEEE 1788-2015 has standardized interval arithmetic. However, few libraries for interval arithmetic are compliant with this standard. The main features of the IEEE 1788-2015 standard are detailed, namely the structure into 4 levels, the possibility to accommodate a new mathematical theory of interval arithmetic through the notion of flavor, and the mechanism of decoration for handling exceptions. These features were not present in the libraries developed prior to the elaboration of the standard. MPFI is such a library: it is a C library, based on MPFR, for arbitrary precision interval arithmetic. MPFI is not (yet) compliant with the IEEE 1788-2015 standard for interval arithmetic: the planned modifications are presented. Some considerations about performance and HPC on interval computations based on this standard, or on MPFI, conclude the paper.

Keywords: Interval arithmetic, IEEE 1788-2015 standard, MPFI library, compliance.