A Rigorous Arbitrary Precision Arithmetic using Dekker's Algorithm

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Using the well known Dekker algorithms for exact 'double length' floating point operations we have developed fast and rigorous algorithms providing an (almost) arbitrary precision arithmetic. All truncation errors are rigorously accounted for in terms of an error interval, the width of which is usually similar to the last significant digit.

We will present first test of the speed and accuracy of a FORTRAN implementation of the algorithms, as well as hand coded special cases for rigorous "double length" operations. We will also outline the future incorporation of these algorithms into the current COSY code to allow rigorous, arbitrary-precision computing with Taylor models.