

Implementation of CADNA library for BLAS and MATLAB: first results

Jean-Luc Lamotte, Yoann Lebars, Nicolas Limare

LIP6-UPMC, UMR CNRS 7606, France

Nowadays, The Matlab Software is an efficient tool to develop and test new numerical methods. To take into account the effect of the round-off propagation, two approaches are well known: interval arithmetic and stochastic arithmetic. The first one, named Intlab, was implemented by S. RUMP under Matlab and is the reference. The goal of this talk is to present the first step toward an implementation of the CADNA library under Matlab.

For vector and matrix operations and linear algebra operations, the Matlab library uses respectively the BLAS (Basic Linear Algebra Subroutines) and the LAPACK (Linear Algebra PACKAGE) which is based on the BLAS library. If we want to develop an efficient implementation of stochastic arithmetic under Matlab, we have to develop an efficient version of the BLAS Library incorporating stochastic arithmetic.

This first work is not simple because stochastic arithmetic breaks the chain of the pipelined operation due to the necessary rounding mode switching. The first part of the talk will present the first results of the implementation of the BLAS~1 functions.

The second part presents the different possibilities of implementing the stochastic type under Matlab and the performance consequences. We will show that an implementation like IntLab is not efficient. The stochastic type has to be inserted in the low level of Matlab. The performance of the different implementations are presented and discussed from a point of view of computation time.