

A Computational Environment for Interval Matrices in C++

Michael Nooner and Chenyi Hu

Computer Science Department
University of Central Arkansas
Conway, AR 72035
email: chu@uca.edu

Abstract

In reliable engineering computing, manipulations of interval matrices are often involved. A computational environment that provides basic linear algebra subroutines (BLAS) for interval matrices is very much needed as a software tool. In this paper, we briefly review the interval BLAS standard proposed in [1] and [2] and then report an object-oriented implementation of the interval BLAS standard in ISO/ANSI standard C++.

The interval BLST standard consists of arithmetic and set operations among intervals, interval vectors, and interval matrices. Fundamental functions, utility functions, and set operations are also included.

The package contains over three main classes: *Interval*, *IntervalVector*, and *IntervalMatrix*. Operations among intervals, interval vectors, and interval matrices are implemented as over 200 class member functions.

This package is portable and robust with built-in error handling features. Instructions on package installation, testing, and usages will be reported at the workshop.

References

- [1] Blackford, G., Demmel. J., Dongarra, J., Duff, and et al: "Basic Linear Algebra Subprograms Technical (BLAST) Forum Standard", *Int. J. High Performance Computing Applications*, No.16, pp. 1-199, 2001.
- [2] Dongarra, J. et al: "An updated set of basic linear algebra subprograms (BLAS)", *ACM Transactions on Mathematical Software*, 28(2), 2002.