
Julien LANGOU
**A fast a-posteriori reorthogonalization scheme for the
Classical Gram-Schmidt orthogonalization in the context
of iterative methods**

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The year 2005 have been marked by two new papers on the Classical Gram-Schmidt algorithm (see [1,2]). These results offer a better understanding of the Classical Gram-Schmidt algorithm. It is finally proved that the Classical Gram-Schmidt algorithm generates a loss of orthogonality bounded by the square of the condition number of the initial matrix. In the first part of the talk, I will quickly review the proof, explain its key points and its implication in the context of iterative methods. In the second part, I will focus on the new results that we have found related to the Classical Gram-Schmidt algorithm. In particular an a-posteriori reorthogonalization scheme extremely efficient is given in the context of iterative methods. (We borrow ideas developped in [3] in the context of GMRES-MGS.)

- A. Smoktunowicz and J. Barlow (2005). A note on the error analysis of Classical Gram Schmidt. Submitted to Numerische Mathematik. http://www.cse.psu.edu/~barlow/cgs_numermath.pdf LucGiraud, JulienLangou, MiroslavRozložník
- Luc Giraud, Serge Gratton, and Julien Langou. A rank- k update procedure for reorthogonalizing the orthogonal factor from modified Gram-Schmidt. SIAM J. Matrix Analysis and Applications, 25(4):1163-1177, August 2004.