A proposal of variant of BiCGSafe method based on optimized product of two polynomials

Seiji Fujino*, Takashi Sekimoto**
*Research Institute for Information Technology, Kyushu University
** Graduate School of Information Science and Electrical Engineering, Kyushu University
{*E-mail: fujino@cc.kyushu-u.ac.jp}

Abstract:
After appearance of CGS and BiCGStab methods, a numer of iterative methods based on Lanczos polynomial added with auxiliary polynomial were proposed independently. Then strategy of combination of two polynomials was generalized as a form of product of two polynomials in 1997. However, the optimization of product of polynomials remains as an open problem. The first solution among neive realization of product-type iterative methods was made partly by Fujino et al. in 2005 owing to adoptation of associate residual in place of residual for decision of undetermined two parameters. They found out a clue in the ordering of developing of polynomials. As a result, they succeeded fairly in reduction of instability of convergence. They refered BiCGSafe method in view of safety convergence. With the same strategy, i.e., adoptation of associate residual, variants of GPBiCG method were produced such as GPBiCG_AR and GPBiCGSafe methods in 2009 and 2011 one after another.

In my talk, we will introduce a variant of BiCGSafe method based on optimized product of polynomials. Here, "optimized" does not mean theoretical but heuristic. However, through many numerical experiments, it seems to hint reasonable estimation.