A Comparison of Iterative Methods to Solve Complex Valued Linear Algebraic Systems

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Abstract. Complex valued linear algebraic systems arise in many important applications. We present analytical and extensive numerical comparisons of some available numerical solution methods. It is advocated, in particular for large scale ill-conditioned problems, to rewrite the complex-valued system in real valued form leading to a two-by-two block system of particular form, for which it is shown that a very efficient and robust preconditioned iterative solution methods can be constructed. Alternatively, in many cases it turns out that a simple preconditioner in the form of the sum of the real and the imaginary part of the matrix also works well but involves complex arithmetics.