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## Scalable and Fast Iteration Methods for Complex Linear Systems

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### Abstract

Complex system of linear equations arises in many important applications. We further explore algebraic and convergence properties and present analytical and numerical comparisons among several available iteration methods such as C-to-R and PMHSS for solving such a class of linear systems. Theoretical analyses and computational results show that reformulating the complex linear system into an equivalent real form is a feasible and effective approach, for which we can construct, analyze and implement accurate, efficient and robust preconditioned iteration methods.

*Key words:* complex symmetric linear system, real reformulation, PMHSS iteration, preconditioning, convergence theory, spectral properties.