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# Complete pivoting strategy for the left-looking Robust Incomplete Factorization preconditioner

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ABSTRACT

In this paper, we have used a complete pivoting strategy to compute the left-looking version of *RIF* preconditioner. This pivoting is based on the complete pivoting strategy of the *IJK* version of Gaussian Elimination process. There is a parameter $\alpha$ to control the pivoting process. To study the effect of $\alpha$ on the quality of the left-looking version of *RIF* preconditioner with complete pivoting strategy, we have used ten different values of this parameter. In the numerical experiments section, the quality of the left-looking version of *RIF* preconditioner with complete pivoting strategy has been compared to the quality of the right-looking version of this preconditioner.

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## 1. Introduction

Consider the linear system of equations of the form

$$Ax = b, \tag{1}$$

where the coefficient matrix $A \in \mathbb{R}^{n\times n}$ is nonsingular, large, sparse and nonsymmetric and also $x, b \in \mathbb{R}^n$. Krylov subspace methods can be used to solve this system [1].

An implicit preconditioner $M$ for system (1) is an approximation of matrix $A$, *i.e.*, $M \approx A$. If $M$ is a good approximation of $A$, then it can be used as the right preconditioner for system (1). In this case, instead of solving system (1), it is better to solve the right preconditioned system

$$AM^{-1}u = b; \qquad x = M^{-1}u,$$

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