

# Improving AOR Method For Consistent Linear Systems

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We consider the following linear system

$$AX = b,$$

where  $A \in R^{n \times n}$ , and  $b \in R^m$  and  $X \in R^n$  is unknown. The iterative matrix of the classical AOR method is

$$L_{r,w} = (I - rL)^{-1}[(I - w)I + (w - r)L + wU],$$

where  $w$  and  $r$  are real parameters with  $w \neq 0$ ,  $I$  is the identity matrix,  $L$  and  $U$  are strictly lower and upper triangular matrices obtained from  $A$ , respectively.

The improvement in AOR method for solving this system has been carried out by Hadjimos [1], Recently, Yao-Tang et al. [2], improved AOR method which has been developed by [1]. In this work, we construct a preconditioner to improve the Accelerated Over-relaxation (AOR) iterative method for solution of linear systems. We reduce the spectral radius of iterative matrix by multiplication of Preconditioner matrix  $p^*$  in to the system

$$p^*Ax = p^*b.$$

By assuming  $p^*A = D^* - L^* - U^*$  and applying the AOR method we obtained the corresponding Preconditioned AOR iterative method whose iterative matrix is:

$$L_{r,w}^* = (D^* - rL^*)^{-1}[(1 - w)D^* + (w - r)L^* + wU^*].$$

We improve the convergence rate of the presented iterative method and generalized the results. The convergence analysis of AOR method has been improved. Main while our method can be used to more class of the linear systems.

*Key words and phrases.* Large linear system, Iterative method, Convergence analysis.

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