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On the Algorithmic Iterative Solutions of Conjugate Gradient, Gauss-Seidel and Jacobi Methods for Solving Systems of Linear Equations

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Abstract : In this paper, efforts were made to examine and compare the algorithmic iterative solutions of the conjugate gradient method as against other methods such as Gauss-Seidel and Jacobi approaches for solving systems of linear equations of the form Ax=b, where A is a real n×n symmetric and positive definite matrix. We performed algorithmic iterative steps and obtained analytical solutions of a typical 3×3 symmetric and positive definite matrix using the three methods described in this paper (Gauss-Seidel, Jacobi, and conjugate gradient methods), respectively. From the results obtained, we discovered that the conjugate gradient method converges faster to exact solutions in fewer iterative steps than the two other methods, which took many iterations, much time, and kept tending to the exact solutions.

Keywords : conjugate gradient, linear equations, symmetric and positive definite matrix, gauss-seidel, Jacobi, algorithm
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