PICARD-SPLITTING ITERATIVE METHOD FOR COMPUTING THE MOORE-PENROSE INVERSE, AND BALANCING CHEMICAL EQUATIONS

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ABSTRACT

In this paper, we solve the following matrix eqution with Picard-Splitting iterative method to obtain an approximate of Moore-Penrose inverse $A^{\dagger}$.

$$AXB = F(X),$$

where $A \in \mathbb{R}^{m\times n}$ is a given matrix, and F is a nonlinear operator, such that the Moore-Penrose inverse $A^{\dagger} \in \mathbb{R}^{n\times m}$ satisfies

$$AA^{\dagger}B - F(A^{\dagger}) = \mathbf{0}.$$

An application of the Moore-Penrose inverse computing is shown to balance important chemical equations. Then we prove the convergence of new method in details. Finally, some numerical examples are solved to discover the applicability of the new method and compare it with some previous methods.

Keywords: Moore-Penrose inverse; Convergence; Iterative method; Balancing chemical equations; Picard-Splitting method.

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