

## **Product Form of the Inverse Revisited**

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Using the simplex method is one of the most effective ways to solve linear optimization problems. The efficiency of the solver procedure is crucial for solving large-scale problems. The solution is obtained by an iterative procedure, where each iteration can be represented by a basis of the linear equation system. During an iteration some vectors must be multiplied by the inverse of the actual basis. In order to speed up these operations, proper basis handling procedures must be applied.

Two methodologies exist in the state-of-the-art literature, the product form of the inverse (PFI) and LU factorization. The majority of the LU methods is widely used, because 120-150 iterations can be done without the need of re-factorization, and the PFI can serve about 30-60 iteration without re-inversion in order to provide numerical stability.

In our work we revisited the PFI and implemented it in such a way that hundreds or sometimes even few thousands of iterations can be done without losing accuracy. The novelty relies in the processing of the non-triangular part of the basis, based on block triangularization algorithms. The resulting inverse of the modified algorithm performs way better than those found in the literature. These results can shed new light on the usefulness of the PFI.

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