

# A deterministic strongly polynomial algorithm for matrix scaling and approximate permanents

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## Abstract

We present a deterministic strongly polynomial algorithm that computes the permanent of a nonnegative  $n \times n$  matrix to within a multiplicative factor of  $e^n$ . To this end we develop the first strongly polynomial-time algorithm for matrix scaling - an important nonlinear optimization problem with many applications. Our work suggests a simple new (slow) polynomial time decision algorithm for bipartite perfect matching, conceptually different from classical approaches.

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