

Abstract Submitted  
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**QUANTUM ALGORITHM FOR LINEAR PROGRAMMING PROBLEMS** PRAMOD JOAG, Professor, DHANANJAY MEHENDELE, Associate Professor — The quantum algorithm (PRL 103, 150502, 2009) solves a system of linear equations with exponential speedup over existing classical algorithms. We show that the above algorithm can be readily adopted in the iterative algorithms for solving linear programming (LP) problems. The first iterative algorithm that we suggest for LP problem follows from duality theory. It consists of finding nonnegative solution of the equation for duality condition; for constraints imposed by the given primal problem and for constraints imposed by its corresponding dual problem. This problem is called the problem of nonnegative least squares, or simply the NNLS problem. We use a well known method for solving the problem of NNLS due to Lawson and Hanson. This algorithm essentially consists of solving in each iterative step a new system of linear equations. The other iterative algorithms that can be used are those based on interior point methods. The same technique can be adopted for solving network flow problems as these problems can be readily formulated as LP problems. The suggested quantum algorithm can solve LP problems and Network Flow problems of very large size involving millions of variables.

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