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# ABSTRACTS

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# Optimization approach for solving nonlinear equation systems: numerical method

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**ABSTRACT**

The paper addresses the solution of nonlinear equation systems. The approach developed here is based on reducing the system to an unconstrained nonsmooth optimization problem, where objective function is the (d.c.) function which can be represented as a difference of convex functions. For finding a global solution to the optimization problem we apply the Global Search Theory based on necessary and sufficient global optimality conditions. Global search method includes two principal parts: local search and procedures of improving a critical point provided by a local search method.
To this end it is necessary to solve the auxiliary (partially linearized) convex nonsmooth optimization problems (both at every step of the special local search method and on the stage of improving a critical point). In order to perform it, we solve the auxiliary nonsmooth optimization problems via reducing to the smooth convex optimization problem, increasing the dimension of the auxiliary problems. In addition, the new auxiliary problems are smooth convex optimization problems with convex inequality constraints.
The computational experiments were carried out on test problems with quadratic functions and of dimension up to 100. For solving smooth auxiliary problems we apply existing methods and software (for instance, IBM ILOG CPLEX) for smooth convex optimization. In addition, we compare the effectiveness of developed algorithms with rather popular solvers.
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**Keywords:** systems of nonlinear equations, d.c. functions, nonconvex optimization, nonsmooth optimization