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Derivative-free SMR conjugate gradient method for constraint nonlinear equations

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Abstract:

Based on the SMR conjugate gradient method for unconstrained optimization proposed by Mohamed et al. [N. S. Mohamed, M. Mamat, M. Rivaie, S. M. Shaharuddin, Indones. J. Electr. Eng. Comput. Sci., 11 (2018), 1188-1193] and the Solodov and Svaiter projection technique, we propose a derivative-free SMR method for solving nonlinear equations with convex constraints. The proposed method can be viewed as an extension of the SMR method for solving unconstrained optimization. The proposed method can be used to solve large-scale nonlinear equations with convex constraints because of derivative-free and low storage. Under the assumption that the underlying mapping is Lipschitz continuous and satisfies a weaker monotonicity assumption, we prove its global convergence. Preliminary numerical results show that the proposed method is promising.