A search-free $O(1/k^{3/2})$ homotopy inexact proximal-Newton extragradient algorithm for monotone variational inequalities

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Abstract

We present and study the iteration-complexity of a relative-error inexact proximal-Newton extragradient algorithm for solving smooth monotone variational inequality problems in real Hilbert spaces. We removed a search procedure from Monteiro and Svaiter (2012) by introducing a novel approach based on homotopy, which requires the resolution (at each iteration) of a single strongly monotone linear variational inequality. For a given tolerance $\rho > 0$, our main algorithm exhibits pointwise $O\left(\frac{1}{\rho}\right)$ and ergodic $O\left(\frac{1}{\rho^{2/3}}\right)$ iteration-complexities.