P-factor method for solving degenerate unconditional optimization problem.

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Abstract
This work is concerned with irregular nonlinear unconstrained optimization problems:

\[ \min_{x \in \mathbb{R}^n} \varphi(x) \]

where \( \varphi''(x^*) \) is singular at the solution point \( x^* \). In this case methods do not applicable. We propose the 3-factor method for solving such type problems:

\[
x_{k+1} = x_k - (\varphi''(x_k) + P_1 \varphi'''(x_k) h + P_2 \varphi^{(IV)}(x_k) h^2)^{-1} \cdot (\varphi'(x_k) + P_1 \varphi''(x_k) h + P_2 \varphi^{(IV)}(x_k) h^2)
\]

where \( P_1, P_2 \) – some orthoprojectors (see reference [1]) and

\[
h \in \text{Ker} \varphi''(x^*) \cap \text{Ker}^2 P_1 \varphi''(x^*)
\]

Keywords: optimization, p-Factor.

References
