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# On the $\eta - (1,2)$ approximated optimization problems

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ABSTRACT.

Let $X$ be a nonempty subset of $\mathbb{R}^n$, $x^0$ be an interior point of $X$, $f : X \to \mathbb{R}$ be a differentiable function at $x^0$, $g : X \to \mathbb{R}^m$ be a twice differentiable function at $x^0$ and $\eta : X \times X \to \mathbb{R}^n$ be a function. In this paper, we attach to the optimization problem

$$(P)\begin{cases} \min f(x) \\ x \in X \\ g(x) \leqq 0, \end{cases}$$

the $(1,2)$-$\eta$- approximated optimization problem

$$(AP)\begin{cases} \min F(x) := f(x^0) + \langle \nabla f(x^0), \eta(x, x^0) \rangle \\ x \in X \\ G(x) := g(x^0) + [\nabla g(x^0)](\eta(x, x^0)) + \\ + \frac{1}{2} \langle [\nabla^2 g(x^0)](\eta(x, x^0)), \eta(x, x^0) \rangle \leqq 0, \end{cases}$$

and we will study the relations between the optimal solutions of Problem $(P)$, the optimal solutions of Problem $(AP)$, the saddle points of Problem $(P)$ and saddle points of Problem $(AP)$.

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