Assumptions 1, 2 are relaxed. Thanks to their constructive nature, the conditions obtained can be easily verified. Since the Assumptions assumed in this paper are weaker than the known from literature constraint qualifications for SIP problems, the new optimality conditions can be applied for a more general case of SIP problems.

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NONLINEAR POSITIONAL DIFFERENTIAL GAME IN THE CLASS OF MIXED STRATEGIES

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The feedback control problem for a nonlinear dynamic system under lack of information on disturbances is considered. The problem on minmax-maxmin of ensured result for a given positional quality index is formalized into an antagonistic two-player differential game in the framework of the concept of the Sverdlovsk (Ekaterinburg) school on the theory of control and differential games. The problem is solved in the class of mixed positional strategies. The existence of a solution for considered differential game – of the value of the game and the saddle point – is determined. The solution of a problem is based on application of the appropriate models-leaders, the so-called methods of minimax and maximin extremal shift [2] and the method of upped convex hulls [1]. Although we use probabilistic mechanisms in formation of control, the final result is guaranteed with probability arbitrary close to one. Results of the study are applied to the control model [3] of a mechanical device. It simulates a controller in the space equipment used for docking and landing of modules. Simulation outputs are presented.

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SUBDIFFERENTIAL SLOPES AND STABILITY OF ERROR BOUNDS FOR CONVEX CONSTRAINT SYSTEMS

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1. Error Bounds. Given a function $f : X \to \mathbb{R}_\infty := \mathbb{R} \cup \{+\infty\}$ on a Banach space X and a point $\bar{x} \in X$ with $f(\bar{x}) = 0$, we say that f admits a (local) *error bound* at $\bar{x}$ if there exist reals $c > 0$ and $\delta > 0$ such that

$$cd(x, S_f) \le [f(x)]_+ \quad \text{for all } x \in B_\delta(\bar{x}),$$

where $S_f := \{x \in X : \ f(x) \le 0\}$ and the notation $\alpha_+ := \max(\alpha, 0)$ is used, or equivalently

$$\operatorname{Er} f(\bar{x}) := \liminf_{x \to \bar{x},\, f(x) > 0} \frac{f(x)}{d(x, S(f))} > 0.$$

2. Subdifferential Slopes. From now on, $f : X \to \mathbb{R}_\infty$ is a proper lower semicontinuous convex function on a Banach space X and $f(\bar{x}) < \infty$. Recall the definition of the *subdifferential* of f at $\bar{x}$:

$$\partial f(\bar{x}) = \left\{x^* \in X^* | \ f(x) - f(\bar{x}) \ge \langle x^*, x - \bar{x}\rangle, \ \forall x \in X\right\}.$$

The *subdifferential slope*, *boundary subdifferential slope*, and *strict outer subdifferential slope* of f at $\bar{x}$ are defined as follows:

$$|\partial f|(\bar{x}) = \inf\{\|x^*\| \mid x^* \in \partial f(\bar{x})\},$$
$$|\partial f|_{bd}(\bar{x}) = \inf\{\|x^*\| \mid x^* \in \operatorname{bd} \partial f(\bar{x})\},$$
$$\overline{|\partial f|}^{>}(\bar{x}) = \liminf_{x \to \bar{x},\, f(x) \downarrow f(\bar{x})} |\partial f|(x).$$