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Stachó, L.L.

A note on König's minimax theorem. (English)

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The following generalization of König's minimax theorem [*H. König*, Arch. Math. 19, 482-487 (1968; Zbl 0179.210)] is deduced from *Ky Fan's* minimax theorem [Proc. Nat. Acad. Sci. USA 39, 42-47 (1953; Zbl 0050.065)] by the function lifting technique of *I. Joó* and the author [Acta Math. Acad. Sci. Hung. 39, 401-407 (1982; Zbl 0493.49013)]. Let X be a compact space, $Y \neq \emptyset$ any set and $f : X \times Y \to \mathbb{R}$ be a real-valued function. By identifying the points of Y with their indicator functions, we embed Y into the space $\overline{Y}$ of all functions $Y \to \mathbb{R}$ with finite support and we define the lifted function $\overline{f} : X \to \overline{Y}$ as the affine continuation of f in the second variable. Then we have $\inf_{y\in Y} \sup_{x\in X} f(x,y) = \sup_{x\in X} \inf_{y\in Y} f(x,y)$ whenever the subfunctions $x \mapsto f(x,y)$ are upper semicontinuous and concave in Ky Fan's sense and the set $\{\overline{y} \in \mathrm{co}(Y) : \exists y \in Y,\ f(\cdot,y) \leq \overline{f}(\cdot,\overline{y})\}$ is dense in the convex hull $\mathrm{co}(Y)$ of Y with respect to the finest locally convex topology in $\overline{Y}$.

L.L.Stachó

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Classification :
∗49J35 Minimax problems (existence)
49J45 Optimal control problems inv. semicontinuity and convergence