Gao, Ying; Yue, Rui-Xue; Tang, Li-Ping
Scalarization and optimality conditions for the approximate solutions to vector variational inequalities in Banach spaces. (English) Zbl 07499358

Summary: In this paper, we present the notion of approximate solutions for vector variational inequalities in Banach spaces, which extends the existing approximate solutions. It is shown that, under the cone subconvexlikeness, our new approximate solutions can be characterized by the approximate solutions of linear scalar problem by means of the convex separation theorem. For the nonconvex cases, based on the nonconvex separation theorem with a special scalar functional introduced by Hiriart-Urruty, we get the nonlinear scalarization results for the approximate solutions. In order to establish optimality conditions without convexity assumption, we calculate the subdifferential of the Hiriart-Urruty nonlinear scalar functional. And based on the scalar characterizations, optimality conditions are obtained by using Ekeland variational principle and Fermat rule for scalar optimization problems. Finally, we consider the special case of vector inequality problems in finite dimensional Euclidean space, and establish some relations between the approximate solutions of vector inequality problems and nonsmooth vector optimization problems.

MSC:
90C26 Nonconvex programming, global optimization
90C29 Multi-objective and goal programming
90C30 Nonlinear programming

Keywords:
vector variational inequality problems; approximate solutions; scalarizations; optimality conditions

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References:

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