A new Minimax Theorem for a class of C^1-Functionals

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Abstract

We establish a new abstract minimax theorem for obtaining ground-state critical points of a class of C^1-functionals. The central feature of this class is that the associated Nehari set is not necessarily a differentiable manifold, but is homeomorphic to a (possibly non-complete) submanifold of the unit sphere. This occurs for functionals whose fibering maps $t \mapsto I(tu)$ possess a unique global maximum point only when u belongs to an open cone in the underlying Banach space. A detailed topological analysis of the Nehari set is conducted to overcome the lack of a standard variational framework on it. As a consequence, we provide a general minimax characterization of the ground-state energy level. The applicability and robustness of our abstract results are demonstrated by considering a range of relevant elliptic partial differential equations, leading to improvements and complements of existing results in the literature.

This is joint work with **J. R. Santos Júnior** (UFPA) and **J. F. F. Silva** (UNIFESSPA).