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Invariant manifolds, variational principles and dynamic programming

The optimality principle of Bellman is frequently used to solve problems in dynamic programming. The optimal selection of the dynamic control is the optimal policy. The method of Bellman leads to the so-called Hamilton–Jacobi–Bellman PDE.

An important observation is that there are areas of dynamics that use variational methods similar to the one of Bellman. In particular, it is possible to use a variational principle to approximate and study the stable and unstable manifolds of a saddle fixed point. In this work we explore the dynamic properties of the principle of Bellman.