

Value function of the infinite horizon optimal control problem

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In this talk I will discuss the value (cost-to-go) function in the context of the infinite horizon optimal control problem. It is well known that this function is a solution to an associated H-J-B equation, which is unique under reasonable assumptions. Even though, in general, the value function may be not differentiable, and even not continuous, still we derived first order necessary optimality conditions in the form of the maximum principle involving also sensitivity relations (shadow price belongs to a subdifferential of the value function along optimal trajectories). The issues of transversality conditions, normality of the maximum principle, validity of the relaxation theorem, behavior at infinity of the co-state will be approached using this tool. Some recent extensions to the state constrained case will be also presented.