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**Conditions for the uniqueness of optimal policies of discounted Markov decision processes.**

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Summary: This paper presents three conditions. Each of them guarantees the uniqueness of optimal policies of discounted Markov decision processes. The conditions presented here impose hypotheses specifically on the state space  $X$ , the action space  $A$ , the admissible action sets  $A(x)$ ,  $x \in X$ , the transition probability  $Q$ , and on the cost function  $c$ . Two of these conditions require mainly convexity assumptions, but the third one does not need this kind of assumptions. However, it needs certain stochastic order relations in  $Q$ , and the cost function  $c$  to reach its minimum with respect to the actions, just in one action. We illustrate the conditions with several examples including, in particular, discrete models, the linear regulator problem, and also a model of an inventory control system.

**MSC:**

[90C40](#) Markov and semi-Markov decision processes

[93E20](#) Optimal stochastic control

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