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Stochastic Control Problems: Linear Formulations, Dynamic Programming, state constraints

Abstract: We present some recent applications of linearization methods in stochastic control. Using occupational measures and viscosity methods, we show how a nonlinear control problem (with and without state constraints) can be stated as a linear programming one on a convenient space of probability measures. This set has several good properties (convexity, compactness) and satisfies a semigroup property. We derive dynamic programming principles for discontinuous cost functionals. We also discuss the use of the method to avoid stability under concatenation assumptions.