

# Asymptotic Perron's method and simple Markov strategies in stochastic games and control

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We introduce a modification of Perron's method, where semi-solutions are considered in a carefully defined asymptotic sense. With this definition, we can show, in a rather elementary way, that in a zero-sum game or a control problem (with or without model uncertainty), the value function over all strategies coincides with the value function over Markov strategies discretized in time. Therefore, there are always discretized Markov  $\varepsilon$ -optimal strategies, (uniform over the mesh of the time grid, and uniform with respect to the bounded initial condition).