

81. Zvi Artstein and Vladimir Gaitsgory, **The value function of singularly perturbed control systems.** Applied Mathematics and Optimization 41 (2000), 425-445.

**Abstract.** The limit as  $\varepsilon \rightarrow 0$  of the value function of a singularly perturbed optimal control problem is characterized. Under general conditions it is shown that limit value functions exist, and solve in a viscosity sense a Hamilton-Jacobi equation. The Hamiltonian of this equation is generated by an infinite horizon optimization on the fast time scale. In particular, the limit Hamiltonian and the limit Hamilton-Jacobi equation are applicable in cases where the reduction of order, namely setting  $\varepsilon = 0$ , does not yield an optimal behaviour.

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