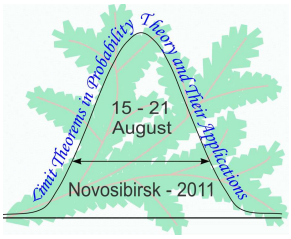

New Approach to the Solution of the Optimal Stopping Problem Based on a Modification of the Payoff Function

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We consider the problem of optimal stopping of a strong Markov procees in discrete or continuous time with payoff function $g(z)$. We say that a function $f(z)$ is a modification of $g(z)$, if there exists a set C such that $f(z) > g(z)$ for all z in C, and for all z the function $f(z)$ equals to the value of the maximizing functional at the time of the first exit from C (if $z \notin C$, then this time equals zero). It is simple to check that in the problems of optimal stopping with the payoff functions $f(z)$ and $g(z)$ the value function is the same. Under natural assumptions we propose a procedure of sequential modification that results in a payoff function for which the optimal stopping time identically equals zero. Thereby the value function is constructing.

In the discrete time this procedure is an alteration of the State elimination algorithm elaborated for the case of finite number of states by Sonin. Such an alteration allows to consider the arbitrary state space.

We consider an application of the proposed procedure to the problem of optimal stopping for regular one-dimensional diffusion that may have a finite number of points of a partial reflection. A discounting and a cost for observation, both depending on the state may be present. The payoff function assumed to be twice differentiable with an exception of the finite number of points where the payoff function and its first derivative may have a discontinuity of the first kind. We show that the proposed procedure results in the constructing the value function in a finite number of steps. Many examples are considered.