On some large deviation estimates in stochastic optimization problems

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Consider the stochastic optimization problem of the type

$$\min_{x\in X}\{f(x) = E\, h(x,\xi_0)\}, \tag{1}$$

where $X = [a,b]$, $\{\xi_i,\, i \in \mathbb{Z}\}$ the a stationary in the strict sense ergodic random sequence, $h(x,\cdot)$ –some summable in the second variable function with $E|h(x,\xi_0)| < \infty$.

Problem (1) can be approximated by

$$\min_{x\in X}\{f_n(x) = \frac{1}{N}\sum_{j=1}^{N} h(x,\xi_i)\}. \tag{2}$$

The conditions under which the probability of large deviations $f_N(x)$ from $f(x)$ decreases exponentially, are formulated. The proof is based on the results proved in [1,2].

[1] J.-D.Deuschel, D.W.Strook, *"Large Deviations"*, Boston, Academic Press, 1989;

[2] P.S.Knopov, E.J.Kasitskaya, *"On large deviations of empirical estimates in stochastic programming problems"*, Cybernetics and System Analysis, 2004 (in press).

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