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# Some sequential problems for Brownian motion with random drift in statistics and finance.

*Tuesday, August 28, 2018 9:00 AM (40 minutes)*

We consider two models of observable process  $X = (X_t)$ :

Model A:  $X_t = \mu t + B_t$ ,

Model B:  $X_t = \mu t + v(t - \theta)^+ + B_t$ ,

where  $B = (B_t)$  is a standard Brownian motion,  $\mu$  and  $v$  are unknown parameters, and  $\theta$  is a disorder time.

For Model A, we consider some sequential statistical problems with different risk functions.

For Model B, we deal with sequential problems of the following type:

$H_1 = \sup_{\tau} EX_\tau$

or  $H_2 = \sup_{\tau} EE(X_\tau)$ ,

$\tau \leq 1$

$\tau \leq 1$

where  $\tau$  is a stopping time. We show that for such functionals  $H_1$  and  $H_2$  optimal stopping times have the following form:

$\tau^* = \inf\{t \leq 1: \psi(t) \geq a^*(t)\}$ ,

where  $\psi(t)$  is some statistic of observations and  $a^*(t)$  is a curvilinear boundary satisfying the Fredholm integral equation of second order. These problems will be applied to the real asset price models (Apple, Nasdaq).

The talk will give a survey of the joint papers of authors with Āetin, Novikov, Zhitlukhin, and Muravlev.

## Summary

**Presenter:** SHIRYAEV, Albert (Steklov Mathematical Institute)