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A PROBLEM ON POSITIONING OF A RANDOM OBJECT BY A SINGLE CHANGE OF ITS TRAJECTORY INCREMENTS

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We consider a problem concerning the positioning of an object, affected by random factors. The aim is to minimize the deviation of a terminal object location from the predefined one by a single change of the increments of the corresponding stochastic process at a selected time moment. As examples, we mention the position of a sail boat, in the presence of random wind, and the problem of hedging of a European option under the assumption that the portfolio can be changed only once.

The problem is related to the theory of optimal stopping, since it is enough to find only an optimal time moment, when the increments of the stochastic process should be changed, and the magnitude of change is determined automatically. Is is explored by the methods of stochastic analysis (martingales, Ito formula), stochastic optimal control (Hamilton-Jacobi-Bellman equation, viscosity solutions) and numerical methods (finite-difference scheme, iteration method). We obtain the lower bounds of the boundary of the continuation region for the cases of Brownian motion with drift and geometrical Brownian motion. The numerical results are compared with these estimates.

Keywords: *optimal stopping problems, viscosity solutions of Hamilton-Jacobi-Bellman equations, optimal control problems, mean-variance rejection hedging.*

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