Shishkova A. A. (Tomsk, Russia) — **Hedging problem for the asian option.**

Consider a standart Black and Scholes model with several risky assets. We assume that the time horizont is $T = 1$. The riskless asset is a constant over time $B = 1$ and risky assets with price processes $(S_i(t))_{1\le i\le d}$ are driven by the following system of SDEs

$$dS_i(t) = \sigma_i S_i(t) dW_i(t), \quad 0 \le t \le 1, \quad i = 1...d.$$

Asian option payoff function is given by $f_1 = (\frac{1}{d}\int_0^1 \sum_{i=1}^d S_i(t)dt - K)_+$, where K – strike price. The main result of the work is the obtained formulas for calculating the hedging strategy $\gamma_i(t) = G'_{y_i}(t, \xi(t), S(t)), \ \ 0 \le t \le 1, \quad i = 1...d$, where

$$G(t, x, y) = \mathbf{E}\left(\frac{\sum_{i=1}^d x_i + \sum_{i=1}^d y_i \tilde{\eta}_i(v)}{d} - K\right)_+$$

$\xi_i(t) = \int_0^t S_i(v)dv$ and $\tilde{\eta}_i(v) = \int_0^v \exp\{\sigma_i W_i(u) - \sigma_i^2 u/2\}, \quad v = 1 - t$. Using the Brownian bridge, we found the densities of random variables $\tilde{\eta}_i(v)$ and studied the analytic properties (differentiability) of the obtained densities. Based on the results presented in [2] we solved the task above. Proved that function $G(t, x, y)$ has continuous derivatives and can be represented by the Ito formula.

REFERENCES

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2. Shishkova A.A. Calculation of Asian options for the Black Scholes model. // Bulletin of Tomsk State University. Mathematics and mechanics. 2018. No.51, pp.48–63. DOI: 10.17223/19988621/51/5

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