$\phi^i(t)$ is the number of items of the corresponding underlying asset, and the function f is the function of the option value [1]. Let's denote the «delta matrix» of the portfolio $\Delta(t)$ (delta is an indicator of the sensitivity of the calculated option value to insignificant fluctuations in the price of the underlying asset), where $\Delta_{ij}(t) = f^{(i)}_{S^j}$, consequently, $f^{(i)} = \sum_{j=0}^n \Delta_{ij}(t) S^j$. Then when

$$\Delta_{i0} = \phi^0(t)$$

the value of the portfolio has the form

$$X(t) = \left(\varphi^0(t) + \sum_{j=0}^n \varphi^i(t)\Delta_{i0}(t)\right) S^0 + \sum_{j=1}^n \left(\sum_{i=1}^n \varphi^i(t)\Delta_{ij}(t)\right) S^j. \quad (1)$$

$\Delta(t)$ should be regular, since this condition ensures the completeness of the market formed by the bond and n options. Let π_{stock} be the optimal trading strategy of the corresponding problem for a stock portfolio, $X^*(T)$ is an optimal portfolio cash flow at the end of the period. Consequently $\varphi^i_{stock}(t) = \pi^i_{stock}(t) X^*(t)/S^i$, $\varphi^0_{stock}(t) = \left(1 - \sum_{i=1}^n \pi^i_{stock}(t)\right) X^*(t)/S^0$. Then the corresponding portfolio value process must satisfy the stochastic differential equation $dX(t) = \left(r\varphi^0_{stock} S^0 + \sum\limits_{i=1}^n \mu_i \varphi^i_{stock} S^i\right) dt + \sum\limits_{i,j=1}^n \varphi^i_{stock} S^i \sigma_{ij} dW^j$. On the other hand, if there is a trading strategy φ with value $X(t)$ in the option market, then based on (1)

$$dX(t) = \left(r\varphi^0 S^0 + \sum_{i=0}^n \varphi^i \left(r\Delta_{i0} S^0 + \sum_{j=1}^n \mu_j \Delta_{ij} S^j\right)\right) dt + \sum_{i,j,k=1}^n \varphi^i \Delta_{ik} S^k \sigma_{kj} dW^j.$$

By equating the right-hand sides of the resulting equations and comparing the coefficients at W, we obtain the optimal strategy for the option portfolio

$$\varphi^i(t) = (\Delta')^{-1} \varphi^i_{stock}(t), \quad \varphi^0(t) = \frac{X(t) - \sum_{i=1}^n \varphi^i_{stock}(t)\, f^{(i)}}{S^0(t)}.$$

As shown by numerous studies, the authors of which tried to find a pattern in the change of financial asset prices, prices change in an unpredictable way. Random price movements indicate that the market works well as an information processing system, it is efficient. The forecast of favorable future behavior of the exchange rate leads to favorable current behavior. Prices rise and fall only in response to new, unpredictable information, because the information that could have been predicted has already been reflected in prices. Therefore, at present, the sections of portfolio theory related to the use of stochastic models undergoing intensive development. These are the methods of the general theory of random processes that are best suited for an adequate description of the evolution of the main (stocks and bonds) and derivatives (forwards, futures, options, etc.) of securities in conditions of uncertainty, and also allow us to introduce dynamics into consideration.

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SOME CASES OF MIXED JOINT DISCRETE UNIVERSALITY FOR CLASS OF ZETA–FUNCTIONS

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The universality property says roughly that any analytic non-vanishing function can be approximated uniformly on any compact subsets of certain vertical strip by shifts of the zeta– or L–functions.

In first decade of XXI century, so called mixed joint universality property was studied by J. Sander and J. Steuding (see [6]) and independently by H. Mishou (see [5]). They showed that any two target functions can be approximated simultaneously by a suitable vertical shift of two different type zeta– or L–functions, i.e., when one of those zeta-functions has the Euler product expression over primes and the other does not (from this fact the term "mixed joint" arises).

In the talk, the rather general mixed joint discrete universality results for a class of zeta–functions, consisting of the Matsumoto zeta–functions $\varphi(s)$ and the periodic Hurwitz zeta-functions $\zeta(s,\alpha;\mathfrak{B})$ will be presented (see [1–4]). They are obtained as author's cooperation with professor Kohji Matsumoto from Nagoya University (Japan).

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ИНТЕГРИРОВАНИЕ ПО ЧАСТЯМ СИНГУЛЯРНОГО ИНТЕГРАЛА С ЛОГАРИФМОМ В ЯДРЕ

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Следующий интеграл для $x \in (0,1)$ мы понимаем в смысле главного значения [1]:

$$\int\limits_0^1 \frac{\varphi(t)\ln^n|t-x|}{t-x}dt = \lim_{\varepsilon\to 0}\left(\int\limits_0^{x-\varepsilon} \frac{\varphi(t)\ln^n|t-x|}{t-x}dt - \int\limits_{x+\varepsilon}^1 \frac{\varphi(t)\ln^n|t-x|}{t-x}dt\right).$$

Пусть функция $\varphi(t)$ является дифференцируемой на интервале $(0,1)$. Тогда справедлива следующая формула:

$$\int\limits_0^1 \frac{\varphi(t)\ln^n|t-x|}{t-x}dt =$$

$$= \frac{1}{n+1}\left(\varphi(1)\ln^{n+1}(1-x) - \varphi(0)\ln^{n+1}x - \int\limits_0^1 \varphi'(t)\ln^{n+1}|t-x|\,dt\right) \qquad (1)$$

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НЕЛОКАЛЬНЫЕ ЗАДАЧИ С ИНТЕГРАЛЬНЫМИ УСЛОВИЯМИ ДЛЯ ДИФФЕРЕНЦИАЛЬНЫХ УРАВНЕНИЙ С ЧАСТНЫМИ ПРОИЗВОДНЫМИ

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Нелокальные задачи с условиями интегрального вида активно изучаются в последнее время — и в связи с потребностями математического моделирования, и как новый раздел общей теории краевых задач для дифференциальных уравнений с частными производными.