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The Producing functionals in solutions of some extreme problems connected with heat conduction and Navier-Stokes equations and some others processes

Muhammadyusuf Yunusi
Tajik National University
Dushanbe, Tajikistan
yunusi@inbox.ru; www.yunusi.tj

***Abstract*—The work are devoted to solutions equations of heat conduction and Navier-Stokes by Producing functionals method. Besides are considered by questions modeling a tree of numbers arising at the analysis of the numerical and corresponding text information. It is shown that many questions of mathematical analysis problems and their applications are reduced to construction of Producing functionals models in extreme regimes and connected with it construction of Model Numbers Tree.Corresponding formulaes are received for equations of heat conduction and Navier-Stokes in the polynomial form. Given others applications from physical, hydromechanical, labor resource and others processes.**

***Index Terms*—class so-called producing functionals, transformations, models equations, heat conduction, Navier-Stokes, polynomial form, hydromechanical and labor resource processes.**

Let is given set[1-3]

$$M=\left\{(a_1\dots a_m):\sum_{j=1}^{m}a_j^{\frac{n}{n-s}}=1,\alpha_j(t)\geq 10,j=1,\bar{}m\right\}$$

m,n,s are natural, $t\in T,T$ is a arbitrary set from $[0,\infty)$. Let $\alpha\in M=M_n^s$ and $\alpha,\ x\in L_m^n(T)$ with norm $\|x\|=(\int\limits_T\sum_{j=1}^m|x_j|^n dt)^{\frac{1}{n}}<\infty$. Assume that defined the set of producing functionals of type

$$\mu(\alpha)=(\int\limits_T(\sum_{j=1}^{m}\alpha_j|x_j|^s)^{\frac{n}{s}}dt)^{\frac{1}{n}}, \qquad (1)$$

are given for all $\alpha\in M_n^s$ and $x\in L_m^n(T)$. The set of functional (1) with norm $\|\mu\|=\sup_{\alpha\in M_n^s}\mu(\alpha)$ is the normed space. It denote by M. Introducing the vector $y=K|x|$, where K is the diagonal matrix with elements $\alpha_j^{1/s}$ we have the space with norm $\mu(\alpha)=\|y\|_{L_m^{n,s}(T)}=(\int\limits_T(\sum_{j=1}^m|y|^s)^{\frac{n}{s}}dt)^{\frac{1}{n}}$. is also the normae space. It denote by $M(\alpha)$.

It is known that at $\alpha=\alpha^0\in M_n^s$, where $\alpha_j^0=\left(\frac{|x_j|^n}{\sum_{j=1}^m|x_j|^n}\right)^{\frac{n-s}{n}}$, $j=1,\bar{}m$ the functional (1) has a maximal value $\|\mu\|=(\int\limits_T\sum_{j=1}^m|x_j|^n dt)^{1/n}=\|x\|_{L_m^n(T)}$, $\|y\|_{L_m^{s,s}(T)}\leq Z$, $\|y\|_{L_m^{n,s}(T)}\leq Z$ and what is more all maximal values of the functional (1) with different $x\in L_m^n(T)$ are solution of the equation $\sum_{j=1}^m X_j^n=Z^n$ where $X_j=(\int\limits_T|x_j|^n dt)^{1/n},j=1,...,m;Z=\|\mu\|$. Besides $M\in M(\alpha)$ for all $\alpha\in M_n^s$ ([1]). Introducing $X_j=(\int\limits_T|x_j|^n dt)^{\frac{1}{n}},\ \ j=1,\bar{}m,\ Z=\|\mu\|$ we have the equation:

$$\sum_{j=1}^{m}X_j^n=Z^n, \qquad (2)$$

It is to easy that $M\in M(\alpha)$ for all $\alpha\in A$. Now we consider the model space of functionals $\hat{M}$ with norm

$$\hat{\mu}(\alpha)=(\int\limits_T\sum_{j=1}^{m}|x_j|^n d\beta_j(t))^{\frac{1}{n}}, \qquad (3)$$

where $x\in L_m^n(T)$, $\beta_j(t)=\int\limits_0^t\alpha_j(t)dt$, $\alpha\in\hat{A}=A_s^n$. Introducing notations $\hat{x}_j=(\int\limits_T|x_j|^n d\beta_j(t))^{\frac{1}{n}}$, $\hat{z}=\hat{\mu}(\alpha)$, we have equations

$$\sum_{j=1}^{m}\hat{x}_j^n=\hat{z}^n, \qquad (4)$$

The set of points $(\hat{x}_1,...,\hat{x}_m)$ with norm $\hat{z}$ is formed the Euclidean model space $\hat{M}^m(\alpha)$, $\alpha\in\hat{A}$. For functionals of type (3) from $\hat{M}$ also take place $\hat{M}=\hat{M}(\alpha)$.

For any natural $n>1$ between to set of solutions (4) (or (2)) (i.e. under $m=k-1$ and $m=k$) it take place next presentations:

$$\hat{x}_{jk}=\hat{x}_{12}\hat{x}_{jk-1},\ \ \hat{x}_{kk}=\hat{x}_{22}\hat{z}_{k-1},$$
$$\hat{z}_k=\hat{z}_2\hat{z}_{k-1},\ \ j=1,k-1 \qquad (5)$$

where $k=3,4,...,m$, $(\hat{x}_{12},\hat{x}_{22})$ is some point of the special Plane with distance $\hat{z}_2=(\hat{x}_{12}^n+\hat{x}_{22}^n)^{\frac{1}{n}}$.

Let $(x_{1k-1}...,x_{k-1k-1},z_{k-1})$ are solutions (4) under $m=k-1$ (the sign of $\hat{}$ is dropped). We shall that $(x_{ik},\dots,x_{kk},x_k)$ obtained by of (5) and are the solutions (4) under $m=k$. So that $\sum_{i=1}^{k-1}x_{ik-1}^n=z_{k-1}^n$, then multiplied both part of the last identify on x_{12}^n we have: $x_{12}^n\sum x_{ik-1}^n=$

$x_{12}^n z_{k-1}^n$. From here $\sum_{i=1}^{k-1}(x_{12}x_{ik-1})^n = (z_2^n - x_{22}^n)z_{k-1}^n$, and hence, using (5) we have: $\sum_{i=1}^{k} x_{ik}^n = z_k^n$, i.e equation (4) under $m = k$. Analogous, if $(x_{ik}..., x_{kk}, z_k)$ also satisfied the equations (1), then it is easy to see $(x_{ik-1}, ..., x_{k-1k-1}, z_{k-1})$ also satisfied (4) under $m = k-1$.The transformation of (5) may be writhen in the form of type: $\hat{x}_m = \mu_t \hat{x}_{m-1}$, where $\hat{x}_m = (\hat{x}_{1m-1}, ..., \hat{x}_{m-1m-1}, \hat{z}_{m-1}\hat{z}_{m-1})$, $\hat{z}_{m-1} = (\sum_{i=1}^{m-1} \hat{x}_{im-1}^{1/t})^t$ and $\hat{x}_m = (\hat{x}_{1m}, ..., \hat{x}_{mm}, \hat{z}_m), \hat{z}_m = (\sum_{i=1}^{m} \hat{x}_{im}^{1/t})^t, m = 1, 2..., \mu_t$ is diagonal matrix of $m+1$ order with elements $\hat{x}_{12}^t, .., x_{12}^t, \hat{x}_{22}^t, z^t$ which are some point of $\hat{M}^2$ with metric $\hat{z}_2 = \hat{x}_{12} + \hat{x}_{22}$ and $0 < \hat{x}_{12} < e^q, 0 < \hat{x}_{22} < e^q$, $0 < \hat{z}_2 < 2e^q$, and $0 \le t \le t_k, t_k < \infty, q = const > 0$. It is noticed that the transformation of μ_t transfers arbitrary point $(\hat{x}_{1m-1}, ..., \hat{x}_{m-1m-1}) \in \hat{M}^{m-1}$ with metric $\hat{z}_{m-1}$ and into some corresponding point $(\hat{x}_{1m}, ..., \hat{x}_{mm})$ from $\hat{M}^m$ with metric $\hat{z}_m$ for all $m \ge 3$ and has semi-group properties: $\mu_{t+s} = \mu_t \mu_s, 0 \le t \le t_k, 0 \le s \le t_k$ and its are linears, uniformly bounded and uniformly continued. Besides, the eignevalues of μ_t are represented in the form of: $\lambda_j = \hat{x}_{12}^t, j = \overline{1, m-1}; \lambda_k = \hat{x}_{22}^t; \lambda_{k+1} = z_2^t; \|\mu_t\| = \hat{z}_2^t; \|\mu_t^{-1}\| < \infty$. The infinitesimal generating operator $K = \lim_{t\to 0} t^{-1}(\mu_t - I)$ is diagonal matrix and represented in the following way: $a_{ii} = \ln \hat{x}_{12}, i = 1, ..., k-1, a_{kk} = \ln \hat{x}_{22}, a_{k+1k+1} = \ln \hat{z}_2$, and what is more $R(m, K) = (qI - K)^{-1}$, $\mu_t = e^{tK}$, $K = \ln \mu_t^{1/t}$. The transformation $\mu_t^{1/t}$ is also transferred $\hat{M}^{k-1}$ into $\hat{M}^k$ under corresponding condition $\hat{x}_{12}^{1/t} + \hat{x}_{22}^{1/t} = \hat{z}_2^{1/t}, 0 \le t \le t_k, t_k < \infty$.

Let the function $u = u(\hat{x}_1, ..., \hat{x}_m, \hat{z})$, $(\hat{x}_1, ..., \hat{x}_m) \in \hat{M}^m, \hat{z} = (\sum_{j=1}^{m} \hat{x}_j^n)^{1/n}$ is the density of some information flow (some substance, or moving object, or so on) and L_j, $j = \overline{1, m}$, L are some operators which are realizing changes of corresponding information flows then $\sum_{j=1}^{m}(L_j u)^n = (Lu)^n$, are its general equations. Really, as $Lu = \max_{\alpha \in \hat{A}} \sum_{i=1}^{m} \alpha_i L_i u$, Then at $\alpha_i = \alpha_i^0$ is corresponding value under which the right of part of the equation has the maximal value and this equation are equivalent. Besides this equation has solution if and only if when the predetermined system $L_j u = \phi_j, Lu = \phi$, where $\phi_j = \phi_j(x_1, x_2...x_m, z), j = 1, 2...m$, $\phi(x_1, x_2, ..., x_m, z)$ are solutions of the next functional equations has a solution $\sum_{j=1}^{m} \phi_j^n = \phi^n$, Having taken $\phi = Z_m = c_m, \phi_j = X_{im} = c_{im}$ and using transformation (5) we have all "simple" solutions of the equations. For example let c_j, c are some numbers solutions of equation $\sum_{j=1}^{m} c_j^n = c^n$ then $\phi_j = c_j \phi(x_1, ..., x_m, z), \phi = c\phi(x_1, ..., x_m, z)$ for all $\phi(.) > 0$ and $\phi \in C$. We may be also take $\phi_j(.) = x_j^{2/n}, \phi = c_0 t^{2/n}$ and considering process will be define in the set of $S_0 \in S$, where $S_0 = \{(x_1, ..., x_m, z) : \sum_{j=1}^{m} x_j^2 = c_0^n t^2, -\infty < x_j < \infty, 0 < t < \infty, n \ge 2\}$ where $z^n = c_0^n t^2$. The set G_0 is series orbit with radius $R = c_0^{n/2} t$, $0 < t < \infty$.In the case of $L_j = \frac{\partial^k}{\partial \hat{x}_j^k}$, $L = \frac{\partial^k}{\partial \hat{z}^k}, k \ge 1$ general solutions of this equation is represented in the form of: $u(x_1, ..., x_m, z) = \varphi(x_1, ..., x_m, z) + \sum_{i=1}^{m} c_i \frac{x_i^k}{k!} + \frac{cz^k}{k!}, -\infty < x_i < \infty, -\infty < z < \infty$ or $u(x_1, ..., x_m, z) = \varphi(x_1, ..., x_m, z) + \sum_{i=1}^{m} \frac{x_i^{k+2/n}}{(1+2/n)...(k+2/n)} + \frac{z^{k+2/n}}{(1+2/n)...(k+2/n)}$, and $\sum_{i=1}^{m} x_i^2 = z^2$, $-\infty < x_i < \infty$, $-\infty < z < \infty$, where c_i, c are the solutions of the equation (2) or (4), the function $\varphi(.)$ is polyoma of the $k-1$-th order. Coefficients of this polyoma we shall define with help of boundary and initial conditions. For example at $m = 2, k = 2$ if we are given $\frac{\partial u}{\partial z} \mid_{z=0} = u_1(x_1, x_2), u \mid_{z=0} = u_0(x_1, x_2)$for definition of the function $\varphi(.)$ we have:$\varphi(x_1, x_2, z) = u_0(0,0) + u_1(0,0)z + \frac{\partial u_0(0,0)}{\partial x_1} x_1 + \frac{\partial u_0(0,0)}{\partial x_2} x_2 + \frac{\partial u_1(0,0)}{\partial x_1} x_1 z + \frac{\partial u_1(0,0)}{\partial x_2} x_2 z + \frac{\partial^2 u_0(0,0)}{\partial x_1 \partial x_2} x_1 x_2 + \frac{\partial^2 u_1(0,0)}{\partial x_1 \partial x_2} x_1 x_2 z$.

We shall defined Numbers Tree for any positive number in the following. Let N there is natural numbers $p, n, m > 1$ and positive numbers a_i,a_{ij},...,$a_{i,m}$ for which take place $N^p = N_m^p$, $N_m^p = a_1^n + a_2^n + ... + a_m^n$, $a_j^p = a_{1j}^n + a_{2j}^n + ... + a_{mj}^n$, $a_{ij}^n = a_{1ij}^n + a_{2ij}^n + ... + a_{mij}^n$, $a_{ijk}^p = a_{1ijk}^n + a_{2ijk}^n + ... + a_{mijk}^n$, ..., $a_{ijk...s}^p = a_{1ijk...s}^n + a_{2ijk...s}^n$ and in last presentation members of the right part can not beat, are submitted as the final sum composed $n-th$ degrees of some integers so-called by a basis of a tree[1]. The number N is uniquely represented as Numbers Tree representation: $N_m^p = \sum k_{j_q} a_{ijj_1 j_2 ... j_q}^n$, where k_{j_q} are numbers of occurrence of a basic element $a_{iij_1 \cdots j_q}$ in a tree of numbers. Representation for N and corresponding Numbers Tree representation are optimum representation. More over with the help of transformation $a_{im} = x a_{im-1}, i = \overline{1, m-1}$, $a_{mm} = y \sqrt[n]{N_{m-1}^p}$, $N_m = z N_{m-1}$, where $x^n + y^n = z^p$ we have the polynomial formulas $N_m^p = \left(x^{m-1}\right)^n + \sum_{i=2}^{m} \left(y x^{m-i} z^{\frac{p(i-2)}{n}}\right)^n$ or $N_m^p = X^{m-1} + Y \sum_{i=2}^{m} X^{m-i} Z^{(i-2)}$, *and* $N_m^p = X^{m-1} + \sum_{i=2}^{m} A_i X^{m-i}$, . which describes the process of Numbers Tree grows and *any complex object* $(a_i, ..., a_{im})$, N_m *is fully defined with the help of infinity or account numbers of elementary objects of type* (x, y, z), *where* $x^n + y^n = z^p$, $X + Y = Z, X = x^n, Y = y^n, Z = z^p$, $A_i = Y Z^{(i-2)}$.

Now we consider definition solutions of solutions equations of heat conduction and Navier-Stokes by Producing functionals method and numbers tree model which are using in different of branches of science and technology.

a). Differential equations with extreme properties for heat conduction. Many real processes (distributions processes of heats and waves, diffusion processes)belong to so-called model equations with extreme properties. In the general case such equations may be represented in the form of: $Lu = \max_{a \in M} \left\{ \sum_{j=1}^{m} a_j \left(L_j u\right)^s \right\}^{\frac{1}{s}}$, *or* $(Lu)^n = \sum_{j=1}^{m} \left(L_j u\right)^n, n > s > 0$, L, L_j are given operators, which characterize the considered physical processes. For heat equation in area G (a rectangular with the sides: l_1, l_2 , and given initial and boundary conditions $u|_{t=0} u_0(x_1, x_2)(x_1, x_2) \in \overline{G}, u\left|_{x_j=0} = 0 = u\right|_{x_j=l_j}, j = \overline{1, 2}$ then the solution is represented in the following kind: $u(x_1, x_2, t) = \frac{2}{\sqrt{l_1, l_2}} \sum_{n_1, n_2=1} D_{n_1, n_2} e^{c_{n_1 n_2} t} \sin \frac{\pi n_1}{l_1} x_1 \sin \frac{\pi n_2}{l_2} x_2$, where D_{n_1, n_2} are coefficients Fourier of function $u_0(x_1, x_2)$, and parameters $c_{n_1 n_2} = c$ are the solutions of the coordination equation: $c_1^n + c_2^n = c^n$ and $c_{n_1 n_2} = n\sqrt{\left(\frac{\pi n_1}{l_1}\right)^n + \left(\frac{\pi n_2}{l_2}\right)^2}$ $n_j =$

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$1, 2, 3, \ldots \quad j = \overline{1, 2}$

b) The equation of Navier-Stokes. The considering equation belongs to as class difficult equations and is the basic at calculation of movement viscous incompressible liquids consisting of three equations which are written down as one vector equation. However generally it is not solved methods of modern mathematics and in practice it is necessary to be limited to the decision of only private problems. Solutions of these equations are unknown, and thus even it is not known, how them to solve. However we have found classes of possible general and smooth solutions that equation on the basis of entered earlier to us a principle of extreme conditions that takes place in processes and objects of the real world. We shall propose that:

The disorder of energy and pressure will be maximal.

Let function $u = u(x,t)$, $t \geq 0$, $x = (x_1, x_2, ..., x_m)$, $x \in G$, $G \subseteq E^m$ is a state of some object (or process) in a point x at the moment of time t. Now we consider Navier-Stokes equation

$$\frac{\partial u_i}{\partial t}+\sum_{j=0}^{3} u_j \frac{\partial u_i}{\partial x_j} = -\frac{1}{\rho}\frac{\partial P}{\partial x_i}+\nu \sum_{j=0}^{3} \frac{\partial^2 u_i}{\partial x_j^2}, -\infty < x_i < \infty, t > 0.$$

Let $u = \sum_i \alpha_i u_i, \alpha \in M$, where $M = \{\alpha : \alpha = (\alpha_1, \ldots, \alpha_m), \sum_j \alpha_j^{\frac{n}{n-s}} = 1\}$. Then we have $\frac{\partial u}{\partial t} + \sum_{j=0}^{3} u_j \frac{\partial u}{\partial x_j} = -\frac{1}{\rho}\frac{\partial P}{\partial x} + \nu \sum_{j=0}^{3} \frac{\partial^2 u}{\partial x_i^2}$. We also suppose that $u_i = \delta_i u$, where $\delta_i \in M$. Then $\sum_j \delta_j \frac{\partial u^2}{\partial x_j} = [-\frac{1}{\rho}\frac{\partial P}{\partial x} + \nu \sum_j \frac{\sum \partial^2 u}{\partial {x_j}^2} - \frac{\partial u}{\partial t}]$. We shall maximize left part of last equation on parameters $\delta \in M$, and we have

$$\sum_j \left(\frac{\partial u^2}{\partial x_j}\right)^n = \left(-\frac{1}{\rho}\frac{\partial P}{\partial x} + \nu \sum_j \frac{\partial^2 u}{\partial {x_j}^2} - \frac{\partial u}{\partial t}\right)^n$$

For solution of this equation we consider next class possibility solution: 1). $\frac{\partial u^2}{\partial x_j} = c_j$ the simple class and 2). $\frac{\partial u^2}{\partial x_j} = c_j u^2$ the exponential class, where $\sum_j c_j^n = c^n$ is coordination equations - algebraic representation.In the beginning we stall consider the exponential class

$$\frac{\partial u^2}{\partial x_j} = c_j u^2, \frac{\partial u}{\partial t} = \nu \sum_j \frac{\partial^2 u}{\partial {x_j}^2} + \frac{1}{\rho}\frac{\partial P}{\partial x}$$

Such we can take $\sum \alpha_i \frac{\partial P}{\partial x_i} = \nu \sum \frac{\partial^2 u}{\partial x_i^2} - \frac{\partial u}{\partial t}$ and we have $\sum (\frac{\partial P}{\partial x_i})^n = (\rho\nu \sum \frac{\partial^2 u}{\partial x_i^2} - cu)^n$. It to allow proving, that the decision exists and is enough smooth function and it will allow essentially changing ways of realization hydro-aerodynamic calculations We shall write some classes of possible solutions (them much - by virtue of a generality of the description of real processes by this the equation) for the initial equation: $\frac{\partial u^2}{\partial x_j^2} = c_j$, the simple class, $\frac{\partial u^2}{\partial x_j^2} = c_j u^2$, the exponential class $\frac{\partial P}{\partial x_j} = d_j$, the simple class, $\frac{\partial P}{\partial x_j^2} = d_j u$, $\frac{\partial P}{\partial x_j} = d_j P$, the exponential class, and $\nu \sum \frac{\partial^2 u}{\partial x_i^2} - \frac{\partial u}{\partial t} = c$, the simple class, $\nu \sum \frac{\partial^2 u}{\partial x_i^2} - \frac{\partial u}{\partial t} = cu$, the exponential class, $\nu \sum \frac{\partial^2 u}{\partial x_i^2} - \frac{\partial u}{\partial t} = cP$, the mixed class where c_j, c, d_j, d be show solutions the so-called equation of the coordination of capacity (the coordination equation): $\sum_{j=1}^{m} c_j^n = c^n$ and $\sum_{j=1}^{m} d_j^n = d^n$ and for a simple class we shall write the appropriate general and smooth solution: $u(x,t) = \sqrt{\left(\int_{-\infty}^{\infty} G(x,\xi)u(\xi,0)d\xi + \int_0^t dt \int_{-\infty}^{\infty} G(x,\xi)(c+d/\rho)d\xi\right)^2 + Q}$, $Q = \sum c_j x_j$, $P(x) = P(0) + \sum d_j x_j$, $u = \sum_{j=1}^{m} \alpha_j u_j$,

$G(x,\xi) = \left(\frac{1}{2\sqrt{\pi\nu}}\right)^3 e^{\frac{\sum_{j=1}^{m}(x_j-\xi_j)^2}{4\nu t}}$ is the sources function.

c). Consider some others examples. From the beginning we consider $\sum_{i=1}^{m} \frac{du_j}{dx}^n = \frac{du}{dx}^n, m = 2, 3...$ and we have $u(x) = u(0)e^{cx}$, $u_j(x) = u_j(0) + u(0)c_j \frac{e^{cx}-1}{n^c}$. Now we consider the equation $\sum_{i=1}^{m} \left(\frac{d^2 u_j}{dx^2}\right)^n = \left(\frac{d^2 u}{dx^2}\right)^n$. In this case we have:

$$u(x) = \begin{cases} C_1 e^{-\sqrt{c}x} + C_2 e^{\sqrt{c}x}, & at \quad c > 0 \\ C_1 cos(kx) + C_2 sin(kx) & at \quad c = -k^2 < 0, \end{cases}$$

$$u_j(x) = \begin{cases} u_j(0) + \frac{du_j(0)}{dx}x + \frac{c_j(C_1e^{-\sqrt{c}x}+C_2e^{\sqrt{c}x})}{c} \\ + \frac{c_j(C_2-C_1)x}{\sqrt{c}} - \frac{c_j(C_1+C_2)}{c}, c > 0, \\ u_j(0) + \frac{du_j(0)}{dx}x - \frac{c_j(C_1cos(kx)+C_2sin(kx))}{k^2} + \\ \frac{c_jC_2x}{k} + \frac{c_jC_1}{k^2}, c = -k^2, \end{cases}$$

where C_1, C_2 are positive constant, c_j, c are solution of (2) type.

d). General model production. The functional (1) characterizes model production. Really consider the consider the case $m = 2$. It is known that in this case model production is presented in the following way[6]: $f(K,L) = f_0 A(\int_T [\alpha(\frac{K(t)}{K_0})^{-\rho} + (1 - \alpha^{\frac{n}{n-s}})^{\frac{n-s}{n}}(\frac{L(t)}{L_0})^{-\rho}]dt)^{-\frac{1}{\rho}}$, where f_0, A, ρ, K_0, L_0 are parameters, $0 \leq \alpha(t) \leq 1$, $0 < \rho < 0$. Introducing notations $\rho = \rho.s$, where $\rho_0 > 0$, s is natural and $\mu(\alpha) = [\frac{f(K,L)}{f_0 A}]^{-\rho_0}$, $x_1(t) = (\frac{K(t)}{K_0})^{-\rho}$, $x_2(t) = (\frac{L(t)}{L_0})^{-\rho}$ we have functional of type (1): $\mu(\alpha) = (\int_T [\alpha x_1^s(t) + (1 - \alpha^{\frac{n}{n-s}})^{\frac{n-s}{n}} x_2^s(t)]dt)^{\frac{1}{s}}$. The set of such functionals with norm $\|\mu\| = sup_{\alpha \in A}\mu(\alpha)$ formed the norms space of type M. Besides, if introduced notations $y_1(t) = \alpha^{1/s}x_1(t)$, $y_2(t) = \alpha^{1/s}x_2(t)$ we have the normed space of type $M(\alpha)$. In the case when $\mu = (\int_T (\sum_{j=1}^{m} \alpha_j \nu^s(u_i, S_j)^{\frac{n}{s}} dt)^{\frac{1}{n}}$, where $\alpha_j = p(S_j/u_i)$, $\alpha = (\alpha_1(t), ..., \alpha_m(t)) \in A$ is the probability of realization the state S_j under actions u_i , $\nu(.)$ is the payoff function the functional (1) characterize model of acceptance of the decisions in conditions when any probability characteristic are not known.

e).The Model of Sarez Lake. Let's mark by mean of $Q(x,t)$ the quantity of perturbed water passing through the cross of reservoir in the point x at the moment time t. Then it's easy to see that from moving equation (the first) we have: $Q(x,t) = Q(0, t - \frac{x}{u})$,where $u = u(x,t)$ is the speed of flow's particle through the given cross. Note that speeding of perturbed wave takes place in both directions from point $x = 0$. That's why we can assumed that $Q(0,t) = \int_{-x_*}^{x_*} \varphi(x)Q(x,t)dx$, where $\int_{-x_*}^{x_*} \varphi(x)dx = 1, \varphi(x) \geq 0$ usual low of the spreading of perturbed wave, x^* is the length of spreading of the given wave. By this way we shall get usual problem with functional initial condition that variety can be in ecology, in

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physics and even in economy. These equation is defined from continuity equation. Really, under integration of this equation we have: $w(x,t)u(x,t) = w(0,t-x/u)h(0,t-x/u)$. The condition is given for determination of this function. Now we consider the discrete equation of with the begin condition for some function $\varphi(x)$. Next representation takes place: $Q(x,t) = C_0 e^{\delta_{max}(t-\frac{x}{u})} + \sum_{j=1}^{\infty} C_j e^{\alpha_j(t-\frac{x}{u})}\cos\beta_j(t-\frac{x}{u})$, where $\delta_{max}, \delta_j = \alpha_j + -i\beta_j$ are the roots of the equation $\int_{-x_*}^{x_*}\varphi(x)e^{-\delta x/u}dx = 1$, more over $\mid \alpha_j \mid \leq \mid \delta_{max} \mid$, C_j are Fourier's coefficients of the function $Q(x,0), Q(0,0) = Q_0$, $j = 1,2....$ It is noticed that formula and these equation are received. Now we shall solved the equation for some distributions laws. From the beginning we consider the case when

$$\varphi(x) = \begin{cases} \frac{1}{2x_*} & at \quad x \in [-x_*, x_*], \\ 0 & at \quad x \notin [-x_*, x_*], \end{cases}$$

and for definition roots we have $sh(\alpha_j + i\beta_j)x_* = 1$. Hence

$$\alpha_j = \frac{arcsh1}{x_*}, \quad \beta_j = \frac{2\pi j}{x_*}, \quad j = 0,1,2,3,...$$

Now we consider the case when

$$\varphi(x) = \frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{x^2}{2\sigma^2}}$$

As $max\varphi(x) = \frac{1}{\sqrt{2\pi}\sigma} = \frac{3}{\sqrt{2\pi}x_*}$ then $\sigma = x_*/3$ and for estimation of the quantity of the perterbed water we take the first wave:

$$Q(x,t) = Q_0 e^{\delta_{max}(t-x/u)}$$

Under supposition $h(x,t) = h(0,t-\frac{x}{u})$ from movement equation we have next formula:

$$u(x,t) = \sqrt{(c_0^2 H - 2g)h},$$

where c_0 is Shezi coefficient, H is power of unperturbed water, h is power of perturbed wave. Note that $(c_0^2 H - 2g)h \geq 0$ under $H \geq H_0 = 4mm - 5mm$ and $u \geq 0$. Under $H = 4mm - 5mm$ we have $u = 0$. Besides $u = c_1 Q^{1/5}$, $h = c_2 Q^{2/5}$, $c \geq c_3 u$, where c_i $i = 1,2,3$ are constants, c is the spead of perturbed wave, $c_3 = 49$. It is noticed that our results are used under mathematical modeling of Sarez Lake on the Pamir mountains. It is known that on the February 18, 1911, the territory of Pamir was struck by an earthquake with a magnitude of 9 on the MSK scale (t=18 ours 41 minutes 14 seconds; $\phi = 38^o N; \lambda = 72.8^o E; H = 26km, M = 7.4; I =$ 9 In the region of the village Usoi, the earthquake triggered a grandiose landslide (over 2 billion m^3 of rock) that bloced the valley of the river Murgab and buried the village Usoi with all its inhabitants in the deris avalanche. The barrage built by the rockslide masses was named Usoi obstruction after the buired village The water of the river Murgab began to accumulate behind the barrage, and flooded one of the largest settlements of the valley, village Sarez. Thus it was formed Lake Sarez with next parameters[1,2]: High water mark=3.265 m, water catchment area = 16.506 km^2, lake surface =80 km^2, length =602 km, maximum width =3.3 km, average width =1.44 km, maximum depth =500 m,average depth =202 m, water storage capacity = 17 km^3. It is known that Sarez Lake is very high seismicity zone and is provided by numerous trace of seismodislocations locateed along the margin of the lake Zones of Lake Sarez are commensurable with size of the foci of large earthquakes and it is situated at the inter action of two large seismo -generating zones Bartang-Pshart and Sares-Zulumart. In connection with we shall consider the possibility of an overflow that might entail the destruction of the weakest part of the dam due to the attacks of powerful flood waves. Such waves can be generated by earthquake shocks and large landslide masses that might be shaken loose to fall into the lake bellow. In both cases the thus generating waves may produce a spillover effect, speed up the process of scouring of the weakest right wing part of the dam, cut a breach in the barrage and trigger a catastrophic mud slide. Now shall bring data of Sarez Lake. Initial dynamical characteristics and parameters are next: 1). The distance from new formation of the mass of oval with volumes 0.9; 0.6; 0.3 km^3 up to Usoi oval is equals to 5 km; 2). The top of supposed oval with volumes o.9km^3 has coordinates $x = 0, h_0 = 3260m$; 3). Coordinates of Usoi oval are $x_u s = 3294m, h_u s = 5000m$. The top of the initial top is equals to 314 m for oval with volume 0.9 km^3. These data and others initial parameters of the Sarez Lake were taken from experiments works. In order to find out how the waves in Lake Sarez might respond to a sudden fall of large dislodged mass of rock into lake and it is expected to realize its dangerous potential, we shall construct mathematical model of Lake Sarez parameters. Main parameters of Sarez Lake are volume of the landslide (km3), over flow volume (mln.m^3), height of the wave (m),the energy of wave the amplitude of the wave,the size of the displaced masses, speed at which various volumes of displaced masses will move, impact of waves of different magnitude on the dam of Lake Sarez. We shall consider Mathematical Model of average on the crows section of flow speed projection-$u(x,t)$ and height of flow wave-$h(x,t)$. It is easy that its are solutions of next differential equations (the Continuity and Moving equations):

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = gsin\psi - g\frac{\partial h}{\partial x} - (\frac{\tau}{\rho h} + \frac{k}{2h}u^2)signu,$$

$$\frac{\partial h}{\partial t} + u\frac{\partial h}{\partial x} = -h\frac{\partial u}{\partial x}, 0 \leq t \leq t_k, x_0 \leq x \leq X_\phi(t),$$

$$u(x,0) = u_0(x), h(x,0) = h_0(0), x_0 \leq x \leq X_\phi(0),$$

$$u(x_0,t) = 0, h(x_0,t) = 0, 0 \leq t \leq t_k,$$

$$\frac{\partial X_\phi}{\partial t} = F(X_\phi(t),t), h(X_\phi,t) = 0, X_\phi(0) = x_0,$$

where ρ is the density of flow, ψ is locus angle of inclination's path to horizon, k is a coefficient of hydraulic impedance, $X = X_\phi(t)$ is a state of flow front in the moment t, g is acceleration of gravity (accelarations of free incidence), τ is a force friction which is determined in the following way:

$$\tau = \begin{cases} fp & Coulomb\ law, \quad (line\ case), \\ fp & at\ fp \leq \tau^* and \\ \tau^* & at\ fp\ \geq \tau^*, Grigorian\ law, \\ \frac{\tau^* p^s}{\tau_0 + p^s} & our\ law, \quad s \geq 0 \end{cases}$$

Here p is a pressure, f is pertaining to Coulomb coefficient $f = \tau^*/\tau_0 = \tau$ under $p \rightarrow 0$, $\tau^* = \lim \tau$ under $p \rightarrow \infty$, $s = const \geq 0$. After integration of these equations under condition $v > 0$ we have: $u^2(x,t) = u^2(x_0, t - x/u)e^{-k\int_{x_0}^{x} \frac{dh}{h(y,t+y/u-x/u)}} + \int_{x_0}^{x}[2gsin\psi(y) - \frac{2\tau(y,t+y/u-x/u)}{\rho h(z,t+z/u-x/u)} - g\frac{\partial h}{\partial x}]e^{-k\int_{y}^{x} \frac{dz}{h(y,t+y/u-x/u)}}dy$, $h(x,t) = h_0(x - ut)e^{-\int_0^t \frac{\partial u}{\partial x}dy}$, $X_\phi(t) = X_0 + \int_0^t u(X_\phi(y,t)dy$, $h(x,t)u(x,t) = h(x_0, t - x/u + x_0/u)u(x_0, t - x/u + x_0/u)$. As $\int_{x_0}^{x} \frac{\partial h}{\partial x} e^{-k\int_y^x \frac{dz}{h}}dy = k(1 - e^{-\int_{x_0}^{x}\frac{dy}{h}}) - k\int_{x_0}^{x} he^{-\int_y^x \frac{dz}{h}}dy$ then we can define functions $u(x,t), h(x,t), X_\phi(t)$. Besides It is noticed that $Q(x,t) = h(x,t)u(x,t)$ is defined.

Computer experiments. Under $t = 10$ the waves altitude is equal to 306m . Others results are are caries out in the following way:

The waves altitude:

$The\ oval\ volume$	$15sec.$	$30sec.$	$60sec.$
$0.9km^3$	$249m$	$185m$	$137m$
$0.6km^3$	$139m$	$97m$	$71m$
$0.3km^3$	$39m$	$28m$	$13m$

The volume of overflow perturbed water:

$The\ oval\ volume$	$15sec.$	$30sec.$	$60sec.$
$0.9km^3$	$.178km^3$	$.197km^3$	$.200km^3$
$0.6km^3$	$.091km^3$	$.106km^3$	$.107km^3$
$0.3km^3$	$.0km^3$	$.0km^3$	$.0007km^3$

Besides some others computer experiments are also carried out. The equation of (1), the condition of (2) and the representation for $Q(x,t)$ is correct in the case of $x \in G \in E^n$. In this case we have next equation:

$$Q(x_1, x_2, ..., x_n, t) = Q(0, 0, ..., t - \frac{1}{n}\sum_{i=1}^{n}\frac{x_i}{u})$$

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