The remaining elements of the matrix $[P^{(1)}]$ и $[P^{(2)}]$and and are equal to zero; δ_{ij}– Kroneker's symbol.

Further, by means of (11) it is excluded from the equations (6), (8)-(10) components of pressure and deformations in fragments (1) and (2), we will receive the effective equation of a condition of a material of *representative volume:*

$$\{\varepsilon_{ij}\}=[S]\,\{\sigma_{ij}\}. \qquad (12)$$

Here the matrix $[S]$ is of dimension 6×6; its elements are given by:

$$s_{1j}=s_{11}^{(2)}p_{1j}^{(2)}+s_{12}^{(2)}p_{2j}^{(2)}+\delta_{3j}p_{13};\quad s_{2j}=s_{21}^{(2)}p_{1j}^{(2)}+s_{22}^{(2)}p_{2j}^{(2)}+\delta_{3j}p_{23};$$

$$j=1,2,3\; j=1,2,3,$$

$$s_{3j}=\rho\left(s_{31}^{(1)}p_{1j}^{(1)}+s_{32}^{(1)}p_{2j}^{(1)}+\delta_{3j}p_{33}^{(1)}\right)+(1-\rho)\left(\left(s_{31}^{(2)}p_{1j}^{(2)}+s_{32}^{(2)}p_{2j}^{(2)}+\delta_{3j}p_{33}^{(2)}\right);\right.$$

$$s_{44}=\rho s_{44}^{(1)}+(1-\rho)s_{44}^{(2)};\quad s_{55}=\rho s_{55}^{(1)}+(1-\rho)s_{55}^{(2)};$$

$$s_{66}=\frac{s_{66}^{(1)}s_{66}^{(2)}}{\rho s_{66}^{(1)}+(1-\rho)s_{66}^{(2)}}.$$

The remaining elements of the matrix $[S]$ are zero.

4. Let's consider, that in a zone of a stain of contact in representative volume conditions are satisfied:

1) $\sigma_{11}=-p$; $\sigma_{12}=\sigma_{13}=\sigma_{23}=0$.

Where p – pressure of a wheel of the car;

2) Deformations in a direction of axes of coordinates 2 and 3 are completely constrained:

$$\varepsilon_{22}=0,\ \varepsilon_{33}=0.$$

Under these conditions from the equation (15) it is found

$$\sigma_{22}=-p_{21}p;\quad \sigma_{33}=-p_{31}p.$$

Where

$$p_{21}=\frac{s_{31}s_{23}-s_{21}s_{33}}{s_{22}s_{33}-s_{23}s_{32}};$$

$$p_{31}=\frac{s_{21}s_{32}-s_{22}s_{31}}{s_{22}s_{33}-s_{23}s_{32}}.$$

Hence, the matrix of average pressure in representative volume looks like:

$$\{\sigma_{ij}\}=\{\sigma\}\cdot p. \qquad (13)$$

Where

$$\{\sigma\}=\{-1\quad p_{21}\quad p_{31}\quad 0\quad 0\quad 0\}^T..$$

As a result, according to the equations (5), (7), (11), (13) pressure in elements of ice, rubber and asphalt are connected with pressure of a wheel in a zone of a stain of contact by the equations

$$\{\sigma_{ij}^{л1}\}=[P^{л1}]\,[P^{(1)}]\,\{\sigma\}p;$$

$$\{\sigma_{ij}^{л2}\}=[P^{л2}][P^{(2)}]\{\sigma\}p;$$

$$\{\sigma_{ij}^{p}\}=[P^{p}][P^{(1)}]\{\sigma\}p;$$

$$\{\sigma_{ij}^{a}\}=[P^{a}]\,[P^{(2)}]\,\{\sigma\}p.$$

Thus, the task in view is solved.

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HIGH-TORQUE ELECTRIC ENGINE FOR THE MOTOR-WHEEL

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In the modern world the economy of industrial resources has got the greatest value. To save on energy is possible only by construction of the electrical machines, that best of all satisfy the requirements for them by these systems.

The constantly growing use of a municipal motor-vehicle transport has led to the necessity of development of the machines which are not pollute air pools by exhaust gases, have low noise level and progressive constructive decisions. Modern technical systems have a number of lacks in the technical and economic parameters due to forces of friction [1]. The new concept of motor-wheel drive excludes many mechanical losses between the engine and the working unit, in which the electric motor and the mechanical transfer are connected [2].

The main area of a motor-wheel's application is motor industry. Such kind of these devices is used in electric cars, bicycles, invalid carriages, moon rovers. Hence the development of trolley buses with independent power supplies is worthwhile today.

As the engine of motor-wheel's drive the variant of the contactless synchronous electric machine with a ring coil on the stator and permanent magnets on the rotor was chosen and designed. It provides wider functionality in the heaviest conditions and operating modes in comparison with asynchronous machine [3]. For the majority of control systems the contactless engine is designed as the high-torque low-speed electrical machine.

The magnetoelectric engine is capable to work also in a mode of the generator of electric energy. The design of the stator of the electrical machine allows to simplify the winding and to protect it from various influences. Owing to the very small front parts of a ring winding, the electric engine has the best power and mass-overall characteristics.

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EFFECTIVE METHOD OF HARD GOLD-CONTAINING ORE PREPARATION TO LEACHING

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For effective preparation of hardly concentrating ores to leaching there are considered to be perspective the methods of two-phased oxidation, which is based on photo electrochemical influence on solutions of reagents with formation of strong oxidants (active forms of oxygen) with the following biooxidation of hard minerals, which are realized in ditch version.

An examination of peculiarities of photo electrochemical influence and bacterial oxidation on the change of material surface structure and the process of dissection of mineral medium was carried out on the polished selection of sulfide minerals of Kokpatassk, Daugyztausk (Uzbekistan), Bugdainsky, Darasun, Teremkinsk (Transbaikalia) deposits. On the base of the analysis of received information of two-phase oxidation it was stated that, by the photo electrochemical influence the sulfide oxidation degree increased by 19,9 % (from 44,2 to 64,1 %) – 26,1 % (from 64,1 to 90,2 %), sulfide sulphur – by 15,9 % (from 40,4 to 56,3 %) – 21,9 % (from 63,1 to 85,0 %). By the photo electrochemical oxidation of minerals the facts of X-ray phase analysis testify the formation of new mineral phases: magnetite, hematite, scorodite, element sulphur. General tendency of sulfides oxidation is confirmed by the results of Eh change from 480 to 780 мВ, pH from 4,5 to 2,0, iron concentration change from 5,1 to 70 g/l and arsenic concentration change from 110 to 180 mg/l in liquid phase.

During the examination of polished selections by incident light it was visually defined that the volume of emptiness till the biooxidation was in average 5-15 %, and – 40-50 %. Softening of mineral matrix by the photo electrochemical influence and formation of nanoaccumulation of element sulphur in optimal regimen stimulates the bacterial oxidation, fastening the leaching of metals by 2-3 times. An iron output into solution in 24 hours in the variants with photo electroactivation was 30-35 g/l, in 36-48 hours – 33,2-70 g/l. when in variants without preliminary treatment – only 8-10 and 20-25 g/l accordingly. Long treatment didn't improve the showings of leaching.

Experimental researches of the two-stage oxidation influence on dissection of hard minerals were carried out on the sulfide ore of Daugyztausk deposits.

On the base of experimental researches there were received new results, which testify the high effectiveness of preparation of hard raw materials with two-stage oxidation to gold leaching: there was received an increase of gold extraction by the cyanidation of oxidized sulfide ore in 46,9 % (from 40,2 to 87,1 %) into a liquid phase and in 41,1 % (from 48,4 to 89,5 %) into a resin.

Firstly on the base of processing of experimental facts of two-stage oxidation with the use of mathematical statistics by the method of Protodyakonov there were received following empirical dependences:

1) degree of material oxidation depends on the duration of photo electrochemical oxidation:

degree of photo electrochemical oxidation of sulfide minerals

$$У_3'(\beta'_{sulph.min}) = 10\cdot(0,84 + 1,01 + \log(X) - 0,21 + \log(X)\cdot 2),$$

degree of photo electrochemical oxidation of sulfide sulphur

$$У_4'(\beta'_{S_s}) = 10\cdot(0,89 + 1,01 + \log(X) - 0,22 + \log(X)\cdot 2).$$