interaction, but similar to interaction, which exist between protons in the nucleus.

3.2. From a mathematical point of view it is obvious, that if in two-electron atom there were no nonclassical interactions, the method VM_1 would give precisiouly analytical solution of a three-body problem. The simplicity of the formulas (4-8) allows to hope, that the analytical solution is possible and with taking into account of nonclassical interactions. It would become possible after an evaluation of correlation energy E_{cor} and constant C from certain general principles.

3.3. From a practical point of view it is interesting, that since some value n usual Coulomb repulsion electrons (decreasing as $1/n^2$) will become less additional not - Coulomb attractions (decreasing as 1/n). It can result in macroscopic case to join of electrons in certain stable or metastable structures - quasineutral (if number of electrons equally to number of positive ions) or charged, just as the protons are integrated in the charged nucleus. The similar processes could spontaneously happen in strong rarefied plasma of intersidereal space, in high layers of an ionosphere of the Sun, Earth and other cases, in which the large distances between charged particles (appropriate to the large values n) are realized. It is possible, that the similar effects could explain at least some from anomalous plasma-like effects observed in atmosphere and an ionosphere, such as a ball lightning etc.

To receive a similar new states of substance in experiment, it is necessary, that the electrons of substance were excited synchronously, i.e. had identical energy and identical values n in each instant . To the present moment not much of similar (doubly exited) states is obtained even for two-electron atoms . For molecules them it is known even less. Moreover both in case of atoms, and in case of molecules the values n are not reached yet value, at which the attraction between electrons exceeds a repulsion between them. In case of macroscopic skew fields the problem of synchronous excitation of electrons up to maximum large n till now not to pose, though technically it is not unattainable, since the similar problems are decided at creation of quantum generators of coherent electromagnetic radiation.

Let's remind also, that the explanation of a superconductivity involves appearance of additional electron-electron attraction , which exceeds Coulomb repulsion under certain conditions.

Moreover there are the direct analogies between additional correlation energy of electrons in superconductors and additional correlation energy of electrons in separate atoms in the literature (see for example [3]), and the Cooper pair sometimes is represented as two electrons moving round an induced positive charge, and is compared to atom of a helium.

All of this makes probablis bose-einstein condensation of synchronously excited electrons both in atoms, and in macroscopic skew fields from that moment, when not - Coulomb attraction of electrons will begin to exceed Coulomb repulsion. The similar superconductivity already could be named super-high-temperature.

Conclusion

The approach based on separation of full energy of multielectron systems on classical Coulomb and nonclassical not - Coulomb parts, allows on the one hand to simplify calculations, and with another - to see interesting regularities, which were not visible at use of more complex methods. Most interesting is the discovery of that fact, that under certain conditions electron-electron attraction exceeds electron-electron repulsion. The most important practical consequence it is the capability of existence of ordered structures of a new type in the special way exited substance.

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The work was submitted to international scientific conference «Prospects for the development of university science», Dagomys (Sochi), 20-23 September 2008, came to the editorial office on 01.09.2008.

POLYMER-IMPREGNATED CONCRETE BASED ON WATER DISPERSION OF VINYL CHLORIDE

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For the purpose of defining maximal chemical durability of the formed material at the optimal con-

tent of the polymer the kinetics of polymer concrete decomposition in acid media has been investigated.

The data got at the investigation of the air content dependence on the polymer-cement ratio in the mortar modified by ВДВХМК-65Е-ВДК (Fig.1) testify that in the area conforming to 7-10% content of the polymer from the cement mass the decrease of air entrainments and increase of the forming closed pores number, the result of which is receiving the polymer-cement frame possessing maximal chemical durability.

The possibility of cement systems lifetime increase in aggressive media owing to their modification by chemically resistant water dispersion has been established in principle.

For the purpose of establishing modified concretes' corrosion resistance the tests in various aggressive media: nitric, sulfuric and hydrochloric acids and also solutions of sodium chloride and sulfate, were carried out. The corrosion resistance was estimated on the modified materials' strength properties loss, when cured in 10% aggressive medium.

Due to the carried out experiments it is established that on the intensity degree of the effect on the modified mortars' physical and mechanical properties the investigated aggressive media represent the following comparative range: hydrochloric acid > sulfuric acid > nitric acid > sodium sulfate > sodium chloride > benzine. In salt solutions the modified materials' durability increases considerably compared to the non-modified ones.

The mathematical treatment of the experimental data inclusive of the works performed by the research workers of A.F. Polak's school, Ivanov F.M., Rozental N.K. and others allowed the author to suggest a calculation formula for the modified concretes' and mortars' durability definition depending on the aggressive agents in the exploitation medium:

$$\tau = -\frac{1}{A_0 \eta}\left[\frac{L}{L_0}\right]^2, \qquad (1)$$

where η - is the aggressive substance concentration in the exploitation medium; L – the thickness of the construction being subjected to the exploitation medium's aggressive effect, (cm); L_0 – the laboratory sample thickness (4 cm); A_0 – the constant defined experimentally by the errors sum-of-squares minimization on the formula (A_0 <0):

$$A_0 = \frac{\sum_{i=1}^{M} \eta_i t_i \ln(S_i / S_0)}{\sum_{i=1}^{M} \eta_i^2 t_i^2}, \qquad (2)$$

where S_i – is the sample strength [kg/cm^2] after being cured in the aggressive medium for the time t_i; m – the number of measurements carried out for every sample; S_0 – the sample strength initial value [kg/cm^2]; η – the mortar concentration ($0<\eta<1$).

The established functional dependence and corrosion resistance of the modified mortars and concretes in acidic and salt aggressive media allow forecasting a material's lifetime and, consequently, structural units' durability as a whole at the anticorrosion protection design stage already.

The work was submitted to international scientific conference «Prospects for the development of university science», Dagomys (Sochi), 20-23 September 2008, came to the editorial office on 11.08.2008.

TECHNICAL SILICON REFINING

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Silicon is widely used in various branches of industry. So, due to its ability to create valuable alloys with unique properties *Si* is used for making rust-resistant pipes when obtaining silicon steel for electrical industry, in transformer, instrumental, corrosion-resistant, heat-proof, spring, constructive and other steels. Silumins (silicon and aluminum alloys) applied in space and aviation, automobile, instrument-building and other industries; corrosion-resistant silicon bronzes, silicon and magnesium alloys, abrasive materials based on silicon carbide are widely known. Silicon is used for the production of a wide range of organic silicon compounds. The ultrapure *Si* – is the main semi-conducting material for transistors, current rectifiers, radio waves enhancers, controllers, electronic chips for computing devices. Silicon serves as the basic material for making photoelectric converters (PEC) as well [1].

The technical (metallurgical) silicon (Si_{tech}) is obtained by the carbo-thermal method out of silica-containing raw material in electric arc furnaces on the general reaction: $SiO_2+2C=Si+2CO$ [2,3]. The Si_{tech} obtained at the melting process dissatisfy the consumer requirements on the ultimate product chemical purity. That is why refining is practiced nowadays.

A complex operation of refining should reduce the content of *Al*, *Ca*, *Fe*, *Ti* and other admixtures in the silica and also fully remove small and big slag pockets. The silicon refining methods (those not introduced into production as well) at the national and overseas plants are based on the following physical and physico-chemical phenomena:

- the slag separation by settling the liquid for coagulation and separation of small inclusions into a single phase;
- the slag separation by the silicon remelting and settling an additive agent of the degassing flux;
- the separation of metallic impurities by their transferring into fugitive chlorides and fluorides by blowing with gases or solid additions gases;