**THE MODELING OF PASSING AND REFLECTING TRANSITIONAL PROCESSES OF ORTHOTROPIC PARAMAGNETIC COMPOSITES**

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By mass-strength characteristics and the thermo-chemical firmness *composites* on the base of armor fibers with metallic properties take key place among constructional materials. So, aluminum and graphitizational compositional materials have been widely used by air-, rocket-, ship- and machinebuilding.

About the orientation of wide-spread one-directional armoring composites have the symmetry of characteristics and properties, in particular, electrical conductivity, therefore, are named by *orthotropic*  (orthogonally anisotropic).

In the upper left part of Mendeleev’s table the most of chemical elements and their salts are paramagnetic if atoms have the magnetic moment but the self-excited magnetization is impossible. The magnetic moments orientation along the normal magnetic intensity of the sounding field has minimized the structural energy and caused the additional composite magnetization (paramagnetism).

The paper purpose is to define passing and reflecting characteristics of orthotropic paramagnetic composites and to research corresponding transitional processes by the quantum-electrodynamic methodology.

Passing and reflecting characteristics are reactions on the local excitation of composites by the point source with step-like density of external current. Cartesian \*-component (\* = *x, y*) of passing and reflecting characteristics have been described by exact analytical expressions:

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where is 1-kind modified Bessel’s function 0-order on imaginary argument, – conductivity along \*-coordinate (\* = *x, y*), *t* – time, *h* – air gap, *c* – light velocity in the air, – dielectric penetrability of the air.

Point source electromagnetic waves those are spherical in the air have became plane in the composite and remained following step-like constituents:

– normal magnetic that generates eddy currents;

– *y*-tangentional electric that has been directed along armor fibers (against the external current in the air);

– *x*-tangentional magnetic with the persistent Fourier-specter, in particular , near the frequency of electronic paramagnetic resonance (EPR).

Such EPR-wave with the length has been created thanks to the reduction of waves length in the air, for example, or at their deeping in the aluminium () or graphitizated () composite accordingly.

The normal magnetic intensity of step-like elementary field and the inner-crystallite magnetic field of armor fibers have splitted the main energy level of paramagnetic atoms (Zeeman’s effect). The prevailing population of its low energy sublevels by valence electrons according to Boltzmann’s distribution has ensured the domination of atoms with the magnetic moments positive projection. Just they amplify the normal magnetic intension (composite paramagnetism) and absorb the energy of *x*-tangentional magnetic constituent at EPR when valence electrons fill higher energy sublevels.

Substantial stages of passing and reflecting process of the step-like field energy coincide in the relative time in such manner.

1. When then the paramagnetism exponantional decrease has been accomplanied by the induction of charges and the currents \*-component (\* = *x, y*) on the outward side of the orthogonal composite surface.
2. When then the linear increase of composite diamagnetism corresponds to the reflection becoming in the air.
3. When then the induction of charges and the currents \*-component (\* = *x, y*) on the inner side of the orthogonal composite surface has been accompanied by the amplified reflection.