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ON VIBRATIONS OF CONDUCTIVE BEAM WITH MOBILE LOAD IN MAGNETIC FIELD.

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It is considered integro-differential equation of conductive beams vibrations in homogeneous stationary magnetic field taking into account external function of excitation from given displacement of mobile load on the beam. By modified method of division of variables some partial solutions of the problem is obtained in analytical form as series under complementary restrictions for sizes of active part of the beam. For different cases of fixation of the ends of beam it is shown that action of mobile load can appear only for separate frequencies of the beam. The results are compared with solution of the problem of natural vibrations of conductive beam in magnetic field. Conditions of damping of such perturbed action of mobile load by external magnetic field were found.

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HYDROMECHANICS OF MULTICOMPONENT MULTIPHASE COMPRESSIBLE MEDIA

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Dynamic effects on muticomponent media take them out of equilibrium state and lead to relaxation processes when components interact and interchange by momentum, energy and mass if chemical reactions take place. Usually the well-known models consider the interchange processes in the frames of pair component interactions taking into account their special features (particle size, surface purity, adhesion properties, etc.). The work proves that the wide-used expression for intensity of momentum interchange between components violates the invariance of energy equation respecting to the Galilean transformation. In this place a tensor of strains external for i^{th} component is proposed and its dependence on component velocities is determined. Multicomponent medium is considered as a continuum medium with averaged values and a new type of mixture effect on each component so called cluster interaction is proposed. The conditions are studied when averaged values P, ρ, E, $\overline{U}$ satisfy the system of conservation laws as well as how these conservation laws correspond to the component conservation laws. Not only new forces $F_s i$ occur in the process of cluster interaction between i^{th} component and mixture but energy fluxes $\overline{Q}_{si}$ acting on each component with velocity not eaqual to equilibrium one. The force F_s and the energy flux $\overline{Q}_s$ acting on continuum medium are connected with F_{si} and $\overline{Q}_{si}$ by the equations

$$F_s = -\sum_{i=1}^{N} \sigma_i F_{si} \qquad (1)$$

$$\overline{Q}_s = -\sum_{i=1}^{N} \sigma_i \overline{Q}_{si} \qquad (2)$$

To eliminate the violence in F_s, $\overline{Q}_s$, F_{si}, $\overline{Q}_{si}$ determination they supposed to be invariant to the Galilean transformation. It is shown that after introducing new forces and fluxes the system of mixture conservation laws is obtained as a sum of component conservation laws. A conception of component non-equilibrium kinetic energy is introduced and additional equation for volume fractions is proposed which closes the system of conservation laws and equation of state of i^{th} component and does not restrict the mixture properties.

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MICROSCOPIC DERIVATION OF EQUATION OF STATE FOR PERFECT CRYSTALS

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This paper is devoted to obtaining of thermodynamic equation of state for perfect crystals. The approach based on particles dynamics method is considered. According to this approach it is proposed to analyze the simple discrete systems as models of materials behavior. Microscopic analogues of the macroscopic quantities as stress tensor, pressure, volume and thermal energy are introduced. Averaging of such quantities is conducted. In this way the desired equation of state in Mi-Gruneisens form is obtained. Analytical and numerical solutions are considered and compared. In a case of small deformations the value of the Gruneisens parameter is found. It is shown that in a case of large deformations the Gruneisens parameter depends on the thermal energy and the Gruneisens equation of state is loosing sense.

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