DYNAMIC DRAG OF EDGE DISLOCATION BY STRUCTURAL DEFECTS IN MAGNETIC MATERIALS

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Properties of real crystals are determined essentially by dynamical behaviour of dislocations. The velocity of dislocation glade in a crystal depends on the interaction of dislocations both with each other and with impurities, phonons, magnons and electrons in a crystal. The dynamic retardation of the motion of single dislocation at point defects was investigated by several authors [1-3]. This retardation depends substantially on the spectrum of dislocation vibrations, which, in turn, is significantly affected by interaction of dislocations both with each other and with other subsystems of the crystal. For a pair of dislocations in the nonmagnetic crystal the dynamic retardation by point defects was studied in [4]. It is known that edge dislocations which are located in planes parallel to the glide plane can be arranged one above the other, thus forming stable configurations. This process provides a basis for the polygonization responsible for the formation of dislocation walls in crystals. Under external stresses, these clusters of dislocations can execute motion over the crystal. In present paper, deceleration of a pair of edge dislocations by elastic defects chaotically distributed in the volume of ferromagnetic crystal has been investigated. The mechanism of the energy dissipation includes an irreversible conversion of the kinetic energy of a moving dislocation into the energy of dislocation vibrations exited by the elastic interaction with point defects. It is shown that the dependence of retardation force on dislocation sliding velocity, concentration of defects, distance between dislocations and magnetization of the crystal is nonmonotonic. In the region of parameters` values with dominating magnetoelastic interaction, this force decreases with the increase of magnetization and magnetoelastic interaction, and gap in spectrum of dislocation vibrations increases on the contrary.

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