DYNAMICS OF DISLOCATIONS IN SOLID SOLUTIONS AT ALTERNATING STRESSES

V. Beloshapka[1], *K. Semenova*[1], *V. Platkov*[2]

[1]Bergyansk State Pedagogical University
(*4, Shmidta Str., 4, Bergyansk 71100, Ukraine; e-mail: belvj@ukr.net*),
[2]Kharkiv National Economic University
(*14b, Metrolohichna Str., Kharkiv 03143, Ukraine; e-mail: vplatkov@gmail.com*)

S u m m a r y

Within numerical methods, we study the dynamics of steady oscillations of a dislocation loop in the presence of weak pinning centers in its slip plane. The analysis is carried out for the zero effective frequency of forced oscillations in wide intervals of oscillation amplitudes and the normalized viscosity. We have established the critical value of the normalized viscosity such that the influence of the viscosity on the overcoming of weak pinning centers by a dislocation disappears when this value is exceeded. Mechanisms of the influence of the viscosity on the dynamics of dislocations at alternating stresses are studied. As the normalized viscosity decreases in an interval below its critical value, the magnitude of the jumps of a deformation on the hysteresis curve increases, and the separation stress of a repinned immovable dislocation decreases. It is shown that such an influence of the viscosity on the dynamics of dislocations is due to the inertial mechanism of overcoming of pinning centers by dislocations. We have studied the influence of the viscosity on the amplitude dependences of the internal friction and the elasticity modulus defect. The former is in good agreement with the established peculiarities of the dynamics of dislocations at the manifestation of the inertial mechanism.