MAGNETIC PROPERTIES AND PERCOLATION IN AMORPHOUS METAL

V.V. Posmet'yev, I.L. Bataronov and Yu.V. Barmin
[a] Voronezh State Technical University [b]

9.7 cm

In order to investigate the amorphous structure in the frame of percolation theory the computer simulation of amorphous metal atomic structure was carried out using the molecular dynamics method. For description of interatomic interaction the pair potential represented as polynomial of the fourth power was used. Simulation was carried out in a cube with periodical boundary conditions containing 104 atoms. In this system the rapid decreasing of temperature with the high rate was performed. In the result of relaxation dense random packing of atoms formed.
The model of atomic structure was studied using unlattice percolation ideas. The clusters determined by a correlation radius (CR): two atoms are in the same cluster if the interatomic distance is less than CR. The analysis shown that percolation cluster has fractal dimensionality D = 1,9 0,2. The CR value is about 0.94 of the value of the mean interatomic distance. It is supposed that in real amorphous metal the percolation cluster described plays the role of a skeleton, because it is the region of major compression in atomic structure. It influences upon magnetic, mechanical, electrical, optical and diffusion properties of amorphous metal.
The work was supported by Russian Foundation for Basic Research, Grants 99-02-17230 and 01-02-06157.

13.4 cm

Subject category :

5. Phase Transitions and Critical Phenomena

Presentation mode :
poster

Corresponding author :
V.V. Posmet'yev

Address for correspondence :
Dept. of Solid State Physics, Voronezh State Tech. Univ.
14 Moskovskii Pr., 394026, Voronezh, Russia
http://web.vrn.ru/lamp

Email address :
victorvpo@mail.ru