Mathematical modeling of the temperature dependence of molten viscosity of metal according to the concept of chaotized particles

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Abstract: Employees of the Chemical and Metallurgical Institute J.Abisheva proposed a new approach based on the Boltzmann distribution [1]. According to this approach, all three aggregate states can be viewed from the perspective of subordination Boltzmann distribution and to connect virtually every state with important characteristics of matter on the basis of excess or excess energy barriers melting and boiling. As in all cases considered particles, differing only in the amount of energy of chaotic motion, then their union and differential display can be described as the concept of chaotized particles. According to the concept of chaotized particles, crystal sliding and steam sliding, liquid sliding particles are present in each of the states of aggregation of matter.

The temperature dependence of viscosity fusion is defined on the basis of the concept of randomized particles in the full range of the liquid state on the uniform model considering degree of association of the elementary clusters of dynamically existing crystal mobility particles. The received form of temperature dependence of viscosity can be used for calculation of energy of activation of a viscous current fusion in a combination with Frenkels equation. A new semi-empirical model of viscosity tested on 28 common metals for which there are reference data on the temperature dependence of viscosity. Obtained high values of correlation coefficients for the proposed model points to its functional characteristics. On this basis there were recommended calculated dependence for each metal.

Keywords: viscosity, chaotic particles, degree of associative clusters, the temperature dependences of the viscosity, liquid metals, fixed point

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References

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