

INTEGRAL-DIFFERENTIAL EQUATION OF FINE GRINDING KINETICS

Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and State Space Agency of Ukraine, 15, Leshko-Popel Str., 49005, Dnepr, Ukraine; e-mail: np-2006@ukr.net

Kinetics for fine grinding the ore is analyzed. The form of an integral-differential Zagustin's equation of the grinding kinetics is employed to describe variations in the distribution function of particles by sizes in grinding. The research objective is to modify the form of a kinetic equation for grinding considering the special features for material jet grinding. To attain this, the derived dependences of characteristics of the acoustic signals fixed in the grinding zone on the technological parameters of the process, particles sizes, and properties of the grinding material are used. Distributive and selective functions of grinding (or a function of selection and failure) are expressed by a maximal amplitude of the acoustic signals. A partial solution of the kinetic equation for jet grinding chamotte is obtained. The results of computations of the grinding kinetics are compared with the data of experimental grinding using the laboratory jet mill.

Keywords: *fine grinding, acoustic signals, equation of kinetics, amplitude, narrow fraction.*

1. *Linch A. D. Cycles for Crushing and Grinding. Simulation, Optimization, Design and Control: translated from English. M.: Nedra, 1981. 343 p. (in Russian)*
2. *Andreev Ye.Ye., Tikhonov O. N. Crushing, Grinding and Preparation of Materials for Enrichment. St.-Petersburg: St.-Petersburg State Mine University. 2007. 439 p. (in Russian)*
3. *Pryadko N. S. Evolution of Theory for Fine Grinding Mineral Resources: Abstract of Doctor's (Eng.) Thesis: 05.18.08 NGU. – Dniepropetrovsk, 2015. 36 p. (in Russian)*
4. *Pryadko N. S. Acoustic and emission monitoring jet grinding // Tekhnicheskaya Diagnostika i Nerazrushayushchiy Kontrol. 2012. No 6. 46 – 52. (in Russian)*
5. *Pryadko N. S., Strelnikov G. A., Ternovaya Ye. V., Grushko V. A., Pyasetskiy N. Yu. On the rate of fine grinding the ore using different-type mills. Tekhnicheskaya Mekhanika. 2014. No 3. P. 114 – 121. (in Russian)*
6. *Pilov P. I., Pryadko N. S., Ternovaya Ye. V. Kinetics of grinding the mixture of sized fractions. Zbagachennya Korysnykh Kopalyn. Dniepropetrovsk: NGU. 2014. No 58(99). P. 101 – 106. (in Russian)*