QUANTITATIVE ANALYSIS (MATLAB) STRUCTURAL COMPONENTS OF THE IMAGE

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The purpose of the statistics are structural components of cast iron with the use of digital image processing and correlation of these improved data with measurements of hardness. Analyzes the image etched (4% solution of HNO_3 in ethanol) of the specimen of ductile iron SShHNMD-50 (53). Chemical composition (wt.%): carbon 2,8 ... 3,5; silicon 1,0 ... 1,6; manganese 0,4 ... 0,7; chrome 0,1 ... 0,5; nickel 1,8 ... 3 , 5; molybdenum 0,2 ... 0,5; copper 0,2 ... 1,2; cerium 0,0005 ... 0,02, 0,02 ... 0,05 magnesium, vanadium 0,01 ... 0,2; barium 0,005 ... 0,02; nitrogen 0,005 ... 0,1.

It is recognized that the structure of the material under study as follows: a certain amount of graphite (***graphite***), a certain Quantity of cementite (***cementite***), matrix. Matrix: bainite, troostitt, regions of dispersed perlite (***pearlite***). Reason for separation and objective assessment of structural components is their morphology on the binary optical image. Selects the following obvious principles of separation of morphological components of the image. (1) Discharge graphite "black", size "large". Equiaxed shape, taking into account the achievements of the technology of spheroidal graphite at a given chemical composition of cast iron. (2) Highlight cementite "white", size "large". This follows from the kinetics of structure formation of iron at the selected chemical composition. (3) The matrix is a homogeneous texture, of about equal size and form of "white" and "black" areas of ferrite (***ferrite***) and cementite (***cementite***).

The developed method of image processing gives the opportunity to make a quantitative analysis of a series of similar samples. Numeric values are specified directly on the image and correspond to the content of the phases (in %).

Approximate nature of the evaluations performed negotiated in advance, however, the proposed method greatly reduces the subjective approach in the phase analysis.

Further separation takes into account the size of structural components, i.e. passes into the dimension's space. Histogram of image is shown in one graph with its approximation, proposed analytical distribution function. All front-end elements are numbered, as the size of their chosen area or equivalent diameter (diameter of a circle of equal area). In addition, indicate the numerical characteristics of empirically constructed distribution. The frequency of distribution is compared to standard techniques with normal. Based on the frequency distribution becomes possible to divide the "big" and "minor" elements of the image.