STATISTICAL THEORY OF PRODUCTION SYSTEMS

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The report formulated the theoretical basis for constructing a statistical model management process. In accordance with the concept of statistical modeling process macro parameter state determined by the state micro parameters large number of objects of labor, distributed in interoperational reserves on technological route. It is demonstrated that at sufficiently large number of objects of labor, located in interoperational reserves there are special regularities that characterize the state of macro parameters of the technological process. The nature of these laws do not depend on the behavior micro parameters, determining state of separate object of labor. To describe the behavior of the object of labor technological phase space was introduced. Point in phase space determines the state of the object of labor at a given time. Properties, which characterize the object of labor, change continuously as a result of processing at transition from one process step to another. Herewith the object of labor during the production cycle describes the trajectory in phase space, which is the set of points that define the state of the object of labor at a certain time. Using object-technological model of interaction with objects of labor and equipment together, it was recorded the kinetic equation for the distribution function of the states of the objects of labor. The movement of each object of labor in the phase space is described by the same dynamic equations (corresponding to the same production technology) with different initial conditions. The distribution function of the states of the objects of labor is defined in such a way that its multiplication by the volume element of the phase space gives the number of objects of labor in indicated volume element. We believe that the volume element has a finite sizes, large enough to contain the required for statistical averaging number of objects of labor, and at the same time sufficiently small compared to the macroscopic dimensions of the volume of phase space containing the phase trajectories of the objects of labor. Kinetic equation of the technological process implements communication of micro-level and macro-level describing of the technological process. Macroscopic characteristics of the technological process are presented with moments of the distribution function over the states of the objects of labor and are defined through model representations about stochastic nature of the effect of equipment on the object of labor and collective interaction of objects of labor between themselves. Resilience of macro parameters of the technological process was investigated. Conditions are obtained that ensure the asymptotic stability of the dynamic behavior of the macro parameters of the technological process. Sufficient conditions for the solvability of the problem about operational management of macro parameters of the technological process were identified. The conditions under which the problem about optimal management of macro parameters has a unique solution were set.