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MODELING PROCESSES OPERATIONAL DISTRIBUTION FLOWS EMPTY WAGONS ON TRIPPING DIRECTION OF TRANSPORT

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Improvement management systems in railway transport is inextricably linked with management of wagon traffic. The intensification transportation and ever-increasing demands for improving efficiency of transportation process determine need for building such control systems rely on ideas systems approach to make decisions and maximum extent use possibilities modern computer technology. On relevance problem building railcar flow control systems, which make it possible develop optimal solutions in real time on basis priori and current information, it is indicated in numerous publications [1, 2].

First all, we note significant difficulties task of choosing criteria for optimal control of wagon traffic in operational conditions. It is not always possible evaluate functioning of transport divisions with one criterion, since in organization traffic flows it is often necessary to take into account conflicting aspects production activities. It is necessary develop set methods and mathematical-technological models that ensure optimal control wagon traffic. To make most effective decision, it is necessary process data on state of transport system and transportation process, subject strict time constraints. Under these conditions, task of choosing optimal variant operational impact on system places high demands on technical, informational and mathematical basis of management.

The construction and implementation optimization models for operational management of transport systems, it was noted in [3], is possible based on multi-level analysis − use decomposition approach and iterative aggregation.

The modern directorate for transport goods and passengers from standpoint of cybernetics is classified as complex controlled system [4]. According to [5], complex system is defined as "a multilevel structure of elements interacting with each other and external environment".

A feature functioning structural subsystems landfill directorate of transportation is maintenance industrial enterprises that carry out loading and are, there fore, points repayment of empty wagons coming from other roads. The functional decomposition of management system landfill management board allows you select subsystems according control functions. The functional subsystems include subsystems for determining volume of loading, planning and decision-making, forming and issuing commands (tasks), adjusting plan, maintaining accounting and accounting documentation.

In practice, monitoring arrival empty cars is carried out discrete points in time, which allows us consider these processes discrete time series. The analyzed discrete time series are formed as result accumulation of number empty cars for certain specified period time. Observations discrete time series made at time points $t_1, t_2, \ldots, t_N$ can be denoted by $x(t_1)$, $x(t2)$, $\ldots, x(t_N)$.

If there are N consecutive values such series available for analysis, then we can write $x_1, x_2, \ldots, x_N$, denoting observations made at equal times. $t_0 + h, t_0 + 2h, \ldots, t_0 + Nh$. By accepting t_0 - for beginning and h - for unit time, x_{tk} can be considered as number empty cars at moment of time k.

The peculiarity study time series is stochastic nature, since future values can only be described using statistical laws of distribution. Statistical analysis flow empty wagons of directorate of transportation allows us consider task constructing mathematical models of wagon traffic with aim predicting future values.

Preliminary estimates parameters mathematical model are found using equations:

$$r_1 = (1 - fq)(f - q) / 1 + q^2 - 2fq, r_2 = fr_1, \quad (1)$$

where r_1, r_2 – first and second random time series autocorrelations fq.

According least squares procedure, we minimize sum squares of deviations is solve an optimization problem form:

$$\sum_{k=1}^{n} a_k^2 = \sum_{k=1}^{n} (v_k + \alpha v_{k-1} + \beta v_{k-2})^2 \to \min_{(\alpha,\beta)} \quad (2)$$

Calculations showed average value is approximately zero, standard deviation ≈ 162.

Mathematical modeling daily traffic flows stochastic time series made it possible to make prediction of future value for required time ahead with given confidence level.

On basis correlation analysis, mathematical models processes of receipt some selected categories empty cars are developed: cars suitable for loading, cars suitable loading for export.

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INFORMATION SECURITY SYSTEMS ARCHITECTURE IN TRANSPORT LOGISTICS

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In information systems of automated control systems for any purpose: in the areas of government, military, banking, vehicle management, etc., the volume and value of strategic and confidential information, which is used and transmitted through information and communication facilities, is constantly growing, therefore Of great importance are the speed and information reliability of data transmission, which determine the effectiveness of information systems.

Since the information security system is a structural unit of information systems, therefore, it is a structural, functional and organizational