Mathemetics and transport

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Transport is sometimes called the circulatory system of a country's economy. Railway, automobile, sea, river, air - these are just general names for a well-known list of modes of transport. Huge numbers of people and essential goods move on land, in the air, and on water. All this is important to do on time and with minimal cost.

The rapid development of motor transport also gave rise to a lot of problems.

One of the methods of mathematical modeling of traffic flows is the application of the concepts and laws of hydrodynamics. its success in establishing the laws of motion of liquid and gas, allow solving some problems of traffic flows and overcome problems.

Asfollows, the flow of machines is represented as a flow through channels of variable width of a compressible fluid, when a decrease in speed occurs with an increase in density. Applicable to traffic: an increase in the number of cars on the road leads to a decrease in the average speed of movement.

Hydrodynamics, for example, is able to optimize the control of traffic lights. We also apply an approach that allows to use the provisions of game theory and elements of the theory of macrosystems used for long-term planning. When participants in the movement seek to reduce their costs (time, money, etc.), a «game» arises.

Let's consider some exsamples

The following indicators are used to measure transportation work:

1) carriage of goods and passengers:

a) Freight flows are characterized by:

- direction and size of freight exchange, which depend on the location of production;
- distance of transportation;
- transportation period (day, month, quarter, year).

The total freight flows of the transport network consists of separate freight flows in the forward and reverse directions. The direction with

the highest freight turnover value is called «forward direction».

1) Freight flow, tones:

$\sum Q = Q1 + Q2 + \ldots + Qn,$

where Q1, Q2, ..., Qn – freight flow by nth type of cargo, tones

The number of transported passengers, pax:

$\sum A = A1 + A2 + \ldots + An,$

where – transported passengers by nth directions.

2) freight turnover. Cargo turnover determines the amount of transport work to move the nth quantity of cargo in tonnes to the ith distance in kilometers.

$\sum AL = Q1L1 + Q2L2 + \ldots + QnLn,$

where L1, L2, L3,…, Li is the distance of transportation for each cargo flow.

3) passenger turnover. Passenger turnover is defined as the sum of the product of the number of passengers carried for the distance of their transportation:

4) $\sum AL = A1L1 + A2L2 + \ldots + AnLn.$

Cargo and passenger traffic are often referred to as transport products.

For this there is an indicator of the given turnover:

$\sum QL(p) = \sum QL + K\sum AL,$

where K – is the conversion factor of passenger-kilometers to ton-kilometers.

Applying mathematical methods to overcome transportation problems implies excellent mathematical knowledge and the same knowledge in the transportation industry.Highly effective solution of large-scale transport problems implies a thorough study of mathematical disciplines, the development of the transport industry as a science and participation in practical activities related to transport.

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