

## MATHEMATICAL MODEL OF MECHANICAL PART OF ALLOCATE ELECTRIC ENGINE DIESEL-TRAINS

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Was developed mathematical model of mechanical part of allocate electric engine diesel-trains, which take into consideration a parallel operation of two equivalent traction asynchronous electric engines, and elastic connections between wagons:

$$\begin{aligned}
 \frac{dV_{v1}}{dt} &= \frac{M_{dv1}}{m_{mot}} - F_{v1v2} - F_{v1}; \\
 \frac{dV_{v3}}{dt} &= \frac{M_{dv2}}{m_{mot}} + F_{v2v3} - F_{v3}; \\
 \frac{dF_{v1v2}}{dt} &= C_{v1v2}(V_{v1} - V_{v2}); \\
 \frac{dF_{v2v3}}{dt} &= C_{v2v3}(V_{v2} - V_{v3}); \\
 \frac{dV_{v2}}{dt} &= \frac{1}{m_{pas}}(F_{v1v2} - F_{v2v3} - F_{v2}),
 \end{aligned} \tag{1}$$

where  $V_{v1}$ ,  $V_{v2}$ ,  $V_{v3}$  – speed of the first, second and third wagons accordingly;  $M_{dv1}$ ,  $M_{dv2}$  – electromagnetic moments that develop the first and second equivalent motors respectively;  $m_{mot}$ ,  $m_{pas}$  – respective masses of the motor and passengers wagons;  $F_{v1v2}$ ,  $F_{v2v3}$  – the interaction forces between the first and second, second and third wagons of diesel train;  $F_{v1}$ ,  $F_{v2}$ ,  $F_{v3}$  – the power of resistance of the first, second and third wagons respectively;  $C_{v1v2}$ ,  $C_{v2v3}$  – elasticity coefficients between the first and second, second and third wagons.

In the model (1) electromagnetic moment of first ( $M_{dv1}$ ) and second ( $M_{dv2}$ ) engines obtained from two parallel working mathematical models actuators diesel train with equivalent asynchronous electric engines [1]. The results of modeling in Matlab and comparing with the real data confirmed the efficiency of the proposed model.

The developed mathematical model allows, on the one hand, get all the main processes occurring in the electric engine, and on the other hand, to monitor distribution of interaction forces between three wagons of diesel train.

**Bibliography:** 1. *Дмитриенко В.Д. Моделирование и оптимизация процессов управления движением дизель-поездов / В.Д. Дмитриенко, А.Ю. Заковоротный. – Х.: Изд. Центр "НТМТ", 2013. – 248 с.*