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SIMULATION OF THE PARALLEL OPERATION OF EXTERNAL AND RAILWAY AC TRACTION POWER SUPPLY SYSTEM TAKING INTO ACCOUNT UNBALANCED CONDITIONS

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Abstract

The article proposes an approach to the simulation of parallel operation of external power supply system and AC traction power supply system in unbalanced conditions which based on separated phase representation of three-phase electric networks. Using this approach allows to take into account various configuration of traction substation connection to external power supply system, nonlinear transformer parameters with the use of approximation the magnetic permeability by function from magnetic field strength and nonlinear parameters of traction load by using active and exchange characteristics of AC electric locomotives. Analytic expressions for determining parameters of evaluation system help formulate mathematical model in the normal form of differential equation system. Using this method, various complex mathematical models can be created, because every block are described with the typical equations. Parallel simulation of external and traction power supply system allows to calculate and analyze the power quality indices, perform research focused on power system checking while new equipment or new technical decision provides in steady-state and transient modes. References 29, figures 6, tables 2.

Key words: mathematical modeling, phase coordinates, traction power supply, external power system, unbalanced mode, load, active and exchange characteristic.

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