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DEVELOPING STOCHASTIC MODEL OF A WORKSHOP POWER GRID

Noisy electric energy within workshop power grids of industrial enterprises results in accelerated physical ageing of electrical facilities as well as in the increased risk of emergency situations. Early evaluation of power quality indices and provision of adequate modes of electric equipment operation under specific conditions is essential research and practice problem.

The problem solution involves a number of experiments under the conditions of different power quality indices, different modes of electric equipment operation, and different means to protect the latter from noisy power. However, such experiments carried out in the context of a real object would result in: significant time consumption because of the necessity to wait for such situations when energy within power grids corresponds to the required quality indices without mentioning losses of electric equipment life; financial expenditures due to the necessity to purchase various high-priced devices to protect the electric facilities and to rehabilitate electric energy within the grids; and accident threat due to the decreased reliability indices of electric facilities operating under the considered conditions.

Computational studies, based upon the development of simulation system as well as upon statistical tests by computers, helps accelerate and simplify considerably the process of the experiments [1]. The method differs from standard experimental ones in the fact that simulation model, implemented by a computer, is analyzed rather than the object itself. In this context, interaction with the former is performed just as it was done with a prototype system and simulation results are processed and tested in such a way as if they were data of full-scale experiments [2] - [3].

Relying upon features of asynchronous motor (AM) functioning within noisy power grid, its electromagnetic model should be completed with a subsystem imitating random changes in electrical energy quality. The latter may be implemented with the help of generation of linear voltage within workshop power grids as well as with the help of the indices calculation.

Paper [4] considered the problems of mathematical modeling of AM. As for the development of generation of random changes in linear voltage within power grid of a workshop, it is independent problem. It assumes the definition: structures of generator of the random changes; statistical regularities of the latter; and, as a consequence, parameters of the generator being synthesized.

It is necessary to synthesize a linear voltage generator in electrical networks of industrial enterprises with low-quality electricity to improve the efficiency of research on the energy-economic simulation model when choosing the optimal option for protecting an AM.

References

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