

DOI: <https://doi.org/10.15407/techned2018.01.069>

**COMPLEX IMPROVEMENT OF POWER QUALITY AND ENSURE ELECTRICAL SAFETY IN LOCAL POWER SUPPLY SYSTEMS WHEN USING HYBRID FILTER COMPENSATING CONVERTERS**

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 1, 2018 (January/February)
Pages	69 – 77

**Authors**

**A.F. Zharkin\***, **V.O. Novskyi\*\***, **D.O. Malakhatka**

Institute of Electrodynamics National Academy of Sciences of Ukraine,  
pr. Peremohy, 56, Kyiv, 03057, Ukraine,  
e-mail: [novsky@ied.org.ua](mailto:novsky@ied.org.ua)

\* ORCID ID : <http://orcid.org/0000-0001-5996-0901>

\*\* ORCID ID : <http://orcid.org/0000-0003-3857-7027>

**Abstract**

*The main aspects of the application for the complex improvement of the electrical power quality*

and the ensure electrical safety in the local power supply systems of the developed hybrid filter compensating converters (GFCC), which are based on a regulated filtering device, "distributive" static synchronous reactive power compensator or a multifunctional reactive power compensator are considered. GFCC are designed to compensate the load currents in the neutral conductor of a three-phase low-voltage network, symmetrical regulation (stabilization) voltage of the load and filtering the currents of higher harmonics in the network. References 14, figures 6, table 1.

**Key words:** local power supply system, voltage quality, electrical safety, hybrid filter compensating converter, transistor AC switch.

Received: 07.09.2017  
Accepted: 06.11.2017  
Published: 29.01.2018

## References

1. DSTU EN 50160:2014 Voltage characteristics of electricity supplied by public electricity networks. Kyiv: Minekonomrozvytku Ukrainy. 2014. 27 p. (Ukr)
2. Zharkin A.F., Novskyi V.O., Malakhatka D.O. Hybrid filter-compensating converters for three-phase systems with nonlinear and variable loads. *Tekhnichna Elektrodynamika* . 2015. No 4. Pp. 48–52. (Ukr)
3. Zharkin A.F., Novskyi V.O., Malakhatka D.O. Analysis and modeling of the operation modes of hybrid filtering-compensating converters designed to provide electromagnetic compatibility in three-phase four-wire systems. *Visnyk NTU «KhPI» Problemy avtomatyzovanoho elektropryvoda. Teoriia i praktyka ta Sylova elektronika i enerhoefektyvnist* . 2017. No 27. Pp. 201–205. (Ukr)

4. Shydlovskiy A.K., Novskiy V.O., Zharkin A.F. Stabilization of electrical energy parameters in three-phase systems by semiconductor correction devices. Kyiv: IED NAN Ukrainy, 2013. 378 p. (Ukr)
5. Shidlovskii A.K., Fediy V.S. Electrical circuits with semiconductor switches. Kyiv: IED NAN Ukrainy, 2010. 270 p. (Rus)
6. Chetoshnikova L.M., Smolencev N.I., Chetoshnikov S.A., Degtyarev D.V. The energy management system in the local electrical network of low voltage. *Polzunovskii vestnik*. 2015. No 1. Pp. 103–107. (Rus)
7. Shydlovskiy A.K., Zharkin A.F., Kaplychniy N.M., Novskiy V.O., Kozlov O.V., Malakhatka D.O. Three-phase electrical network. Patent na korysnu model No 117704 Ukraina. Opubl. 10.07.2017, Biul. No 13. (Ukr)
8. Rules for the arrangement of electrical installations. Kharkov: Fort, 2015. 808 p. (Rus)
9. Benysek G. Improvement in the Quality of Delivery of Electrical Energy using Power Electronics Systems. – London: Springer, 2007. 191 p.
10. Kulkarni O., Mishra M. Power quality improvement using Zig-Zag transformer and DSTATCOM in three phase power distribution system. India Conference (INDICON), *Annual IEEE*. Mumbai, India, 2013. Pp. 1–6.
11. Jayaprakash P., Singh B., Kothari D. Reduction in rating of voltage source converter of DSTATCOM using a Zig-Zag transformer. *Industrial Electronics* (ISIE), 2012. Hangzhou, China: IEEE, 2012. Pp. 1066–1071.
12. Song Q., Yin Z., Xue J. Zero-sequence harmonics current minimization using zero-blocking reactor and Zig-Zag transformer. Third International Conference on *Electric Utility Deregulation and Restructuring and Power Technologies*. Nanjing, China: IEEE, 2008. Pp. 1758–1764.
13. Strzelecki R., Mysak P., Woiciechowski D. 18-pulse diode rectifier with active Power filter. *Pratsi Instytutu elektrodynamiky Natsionalnoi akademii nauk Ukrainy. Spetsialnyi vypusk*. 2013. Pp. 118–128.
14. Kumar S.R., Surendhar S., Negi A., Raja P. Zig-Zag Transformer performance analysis on harmonic reduction in distribution load. India Conference *Electrical, Control and Computer Engineering* (INECCE). 2011. Pp. 107–112.

[PDF](#)