

DOI: <https://doi.org/10.15407/techned2017.01.010>

HEISENBERG'S UNCERTAINTY PRINCIPLE IN EVALUATING THE LEVEL OF POWER GENERATED BY RENEWABLE SOURCES

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 1, 2017 (January/February)
Pages	10 – 16

Authors

K.S. Osypenko, V.Ya. Zhuikov

National Technical University of Ukraine "Kyiv Polytechnic Institute",
pr. Peremohy, 37, Kyiv, 03056, Ukraine,
e-mail: ekateryna.osypenko@gmail.com

Abstract

The influence of the Heisenberg uncertainty principle of distributed generation systems is shown. The formulas for calculating the storage battery power and maximum power that can be obtained from renewable sources are given. The expediency of piecewise linear approximation of primary power flow change graphics with Franklin functions is shown. The approach to determine the optimal number of observation intervals at the basic interval and the number of approximating functions at each observation interval is given. It is shown that for the effective control in distributed generation power system there have to be two control channels. References 10, figures 3, tables 2.

Key words: maximum power point tracking, renewable power sources, Heisenberg's uncertainty principle, distributed generation, Franklin functions.

Received: 12.07.2016

Accepted: 18.10.2016

Published: 19.01.2017

References

1. The archive of the meteorological observations. Data on airfields in Europe. Available at: <http://www.pogoda.by/zip-avia/index.php?Year=2015&sortBy=country>
2. Baziuk T.M., Blinov I.V., Butkevych O.F., Honcharenko I.S., Denysiuk S.P., Zhuikov V.Ia., Kyrylenko O.V., Lukianenko L.M., Mykolaiets D.A., Osypenko K.S., Pavlovskyi V.V., Rybina O.B., Steliuk A.O., Tankevych S.Ye., Trach I.V. Intelligent power systems: elements and modes. Kyiv: Instytut Elektrodynamiky Natsionalnoi Akademii Nauk Ukrainy, 2016. 400 p. (Ukr)
3. Zhuikov V.Ya., Suchyk V.E., Denysiuk S.P. The application of the approximation signals and structural synthesis in the design of valve converters. Voprosy analiza i sinteza ustroystv elektropitaniia na EVM. Kyiv, 1983. Pp. 33–55. (Rus)
4. Trakhtman A.M. The introduction to the theory of generalized spectral signals. Moskva: Sovetskoe Radio, 1972. 468 p. (Rus)
5. Boico F., Lehman B. Study of Different Implementation Approaches for a Maximum Power Point Tracker. *IEEE COMPEL Workshop*. 2006. Pp. 15–21.
6. Franklin Ph. A set of continuous orthogonal functions. *Mathematische Annalen*. 1928. No 100. Pp. 522–529.
7. Haihua Zhou, Tanmoy Bhattacharya, Duong Tran, Tuck Sing Terence Siew, Ashwin M. Khambadkone, Composite Energy Storage System Involving Battery and Ultracapacitor With Dynamic Energy Management in Microgrid Applications. *IEEE Transactions on Power Electronics*

. 2011. Vol. 26. Issue 3. Pp. 923 – 930.

8. Heisenberg, W. Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik. *Zeitschrift für Physik* 43 (3–4): 172–198.

9. Nacer K. M'Sirdi, Bechara Nehme, Mouna Abarkan, Abdelhamid Rabbi. The best MPPT algorithms by VSAS approach for Renewable Energy Sources (RES). 3rd International Symposium on 2014, 19-21 Nov. *Environmental Friendly Energies and Applications* (EFEA). Pp. 1–7.

10. Tanabe T., Sato T., Tanikawa R., Aoki I., Funabashi T., Yokoyama R. Generation scheduling for wind power generation by storage battery system and meteorological forecast. *Power and Energy Society General Meeting - Conversion and Delivery of Electrical Energy in the 21st Century*, IEEE. 2008. Pp. 1–7.

[PDF](#)