DOI: https://doi.org/10.15407/ techned2017.04.079

RESEARCH OF EXCESS KURTOSIS SENSITIVENESS OF DIAGNOSTIC SIGNALS FOR CONTROL OF THE CONDITION OF THE ELECTROTECHNICAL EQUIPMENT

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Sciences of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 4, 2017 (July/August)
Pages	79 – 85

Authors
V.S. Beregun[1]*, A.I. Krasilnikov[2]
[1] – National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute»,
pr. Peremohy, 37, Kyiv, 03056, Ukraine,
email: viktorberegun@i.ua
[2] – Institute of Engineering Thermophysics of NAS of Ukraine,
str. Zheliabova, 2a, Kyiv, 03057, Ukraine,
email: tangorov@voliacable.com
*ORCID ID : http://orcid.org/0000-0002-6673-4491

Abstract

Expediency of use of diagnostic signals excess kurtosis for recognition of two conditions of control object is proved. On examples of typical symmetric distributions bigger sensitivity of excess kurtosis to difference of diagnostic signals distributions in comparison with an integrated metrics is confirmed. An algorithm is proposed and the minimum sample size of the diagnostic signal is calculated to estimate the excess kurtosis required to detect defects in the diagnosed

object. Computer simulation of the excess kurtosis realizations of vibration of rolling bearings of electric machines is carried out. When carrying out the simulation, Student distribution was used as a test with different degrees of freedom, which confirmed the reliability of the results obtained. References 10, figures 5, tables 3.

Key words: control systems, vibration diagnostic signals, excess kurtosis, non-Gaussian distributions, rolling bearings of electric machines.

Received: 09.02.2017
Accepted: 24.04.2017
Published: 15.06.2017

References

1. Babak S.V., Myslovich M.V., Sysak R.M. Statistical diagnostics of the electrotechnical equipment. Kyiv: Instytut Elektrodynamiky Natsionalnoi Akademii Nauk Ukrainy, 2015. 456 p. (Rus)
2. Baranov V.M., Gritsenko A.I., Karasevich A.M. Acoustic diagnostics and control at enterprises of the fuel-power industry. Moskva: Nauka, 1998. 304 p. (Rus)
3. Beregun V.S., Garmash O.V., Krasilnikov A.I. The root-mean-square errors of estimates of fifth and sixth-order cumulant coefficients. *Elektronnoe modelirovanie*. 2014. Vol. 36. No 1. Pp. 17–28. (Rus)
4. Beregun V.S. Research of accuracy of symmetrical probability density function approximation by orthogonal representations of the Hermite polynomials. *Elektronnoe modelirovanie* . 2016. Vol. 38. No 3. Pp. 87–97. (Rus)
5. Vadzinskii R.N. Directory on probabilistic distributions. Sankt-Petereburg: Nauka, 2001. 295 p. (Rus)

6. Kliuev V.V., Parkhomenko P.P., Abramchuk V.Ie. Technical Diagnostic Tools. Moskva: Mashinostroenie, 1989. 672 p. (Rus)
7. Krasilnikov A.I. Models of noise signals in systems of diagnostics of the heat-and-power equipment. Kyiv: Institut Tekhnicheskoi Teplofiziki Natsionalnoi Akademii Nauk Ukrainy, 2014. 112 p. (Rus)
8. Lemeshko B.Yu., Lemeshko S.B., Postovalov S.N., Chimitova E.V. Statistical data analysis, simulation ana study of probability regularities. Computer approach. Novosibirsk: Izdatelstvo NGTU, 2011. 888 p. (Rus)
9. Rusov V.A. Measurement of partial discharges in insulation of high-voltage equipment. Ekaterinburg: Izdatelstvo UrGUPS, 2011. 368 p. (Rus)
10. Wang H., Chen P. Fault Diagnosis Method Based on Kurtosis Wave and Information Divergence for Rolling Element Bearings. WSEAS Transactions on Systems. 2009. Vol. 8. Issue 10. Pp. 1155–1165.

PDF