

DOI: <https://doi.org/10.15407/techned2017.01.044>

COMPLEX MODEL WITH FREQUENCY DEPENDENT PARAMETERS FOR ELECTRODYNAMIC SHAKER CHARACTERISTICS

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	44 – 51

Authors

R.P. Bondar¹, A.D. Podoltsev²

¹ – Kyiv National University of Construction and Architecture,
Povitroflotsky ave., 31, Kyiv, 03680, Ukraine,
e-mail: rpbondar@gmail.com

² – Institute of Electrodynamics of the National Academy of Sciences of Ukraine,
Peremohy pr., 56, Kyiv, 03057, Ukraine,
e-mail: podol@ied.org.ua

Abstract

The complex model with frequency-dependent parameters for calculation of electrodynamic shaker operating characteristics is offered. The parameters of an equivalent circuit of the device model are depended on frequency that provides increase of calculation accuracy. The influence of frequency on parameters of the electrodynamic shaker is researched with help of numerical field model. On the basis of the presented equivalent circuit, characteristics of the vibrator depending on frequency are calculated. The problem of calculation of operating characteristics

by means of the complex model based on the equations of an electromagnetic field, electric and electromechanical circuits is solved. References 11, figures 5, table 1.

Key words: equivalent circuit, electrodynamic shaker, operating characteristics.

Received: 13.05.2016

Accepted: 15.07.2016

Published: 19.01.2017

References

1. Bondar R.P., Golenkov G.M., Lytvun A.Yu., Podoltsev A.D. Modeling of power characteristics of the vibrator with a linear electric drive. *Elektromekhanichni i enerhozberihaiuchi systemy* . 2013. No 2. Pp. 66–74. (Ukr)
2. Golenkov G.M., Abbasyan Mohsen. The equivalent circuit of coaxial-linear motor with an axial and radial magnetization vector of the permanent magnets. *Visnyk NTU "KhPI". Seriya Elektrychni Mashyny i elektromekhanichne peretvorennia enerhii* . 2015. No 5 (1114). Pp. 27–31. (Rus)
3. Podoltsev A.D., Kucheriava I.N. Multiphysics modeling in electrical engineering. Monografiia. Kiev: Institut Elektrodinamiki Natsionalnoi Akademii Nauk Ukrainy, 2015. 305 p. (Rus)
4. Haixing Wang, Haichao Feng, Jikai Si. Modeling analysis and parameters calculation of permanent magnet linear synchronous motor. *Journal of computers*. 2013. Vol. 8. No 2. Pp. 463–470. DOI: <https://doi.org/10.4304/jcp.8.2.463-470>
5. Hoff E., Brennvall J.E., Nilssen R., Norum L. High power linear electric machine – made possible by gas spring. 2004. [Web]. 15th April 2016. [http://www.elkraft.ntnu.no/en/Papers%](http://www.elkraft.ntnu.no/en/Papers%20)

[202004/NORPIE04-Hoff-Brennvall-Nilssen-Norum.pdf](#)

6. Julien Gomand, Ghislain Remy, Abdelmouna Tounzi, Pierre-Jean Barre, Jean-Paul Hautier. Impact of permanent magnet field on inductance variation of a PMLSM. European Conference on Power Electronics and Applications, Denmark. 2007. Pp.1-9. [Web]. 15th April 2016.

<https://hal.archives-ouvertes.fr/hal-00786305>

7. Kim Y.B., Hwang W.G., Kee C.D., Yi H.B. Active vibration control of suspension system using an electromagnetic damper. *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering*. 2001. Vol. 215. No

8. Pp. 865–873. DOI:

<https://doi.org/10.1243/0954407011528446>

8. Martino O.A. Hybrid time-frequency domain adaptive filtering algorithm for electrodynamic shaker control. *Journal of Engineering and Computer Innovations*. 2011. Vol. 2(10). Pp. 191–205.

9. Park K., Hong E., Lee H. K. Linear motor for linear compressor. International Compressor Engineering Conference. 2002. Paper 1544. [Web]. 15th April 2016. <http://docs.lib.purdue.edu/icec/1544>

10. Shaw J. Active vibration isolation by adaptive control. In Proc. IEEE International Conference on *Control Applications* (Hawaii, USA). 1999. Pp. 1509–1514.

11. Watada M., Fukuya Y., Ebihara D., Okada T., Takura T. Kinetic characteristics of cylindrical moving coil linear DC motor for vibrator. *Electrical Machines and Drives*. Seventh International Conference. 1995. No 412. Pp. 359–362. DOI:

<https://doi.org/10.1049/cp:19950894>

[PDF](#)