Numerical Model for a Plunger-Type AC Electromagnet

Ioan C. Popa
Faculty of Electrical Engineering University of Craiova Craiova, Romania
ipopa@elth.ucv.ro
Alin-Iulian Dolan
Faculty of Electrical Engineering University of Craiova Craiova, Romania
adolan@elth.ucv.ro

***Abstract*—In this paper we propose an approach for the determination of static force characteristic of a plunger-type AC electromagnet using 2D numerical model developed in QuickField software. The attraction electromagnetic force is calculated using Maxwell stress tensor method. The numerical model is an AC magnetics problem coupled with the coil electric circuit. The numerical model has been experimentally validated.**
***Keywords*—numerical modeling; plunger-type electromagnet; static force characteristic; electromagnetic force.**

REFERENCES

[1] G. A. Cividjian, I. Popa, M. Leoveanu, "Attraction force of electromagnets with armature in T," National Conference on Electrical and Power Engineering, Vol. 9 Electrical Apparatus, Timişoara, September 1982, pp. 65-70.
[2] Y. Kawase, and S. Ito, "Analysis of attactive force of pull-type single phase a.c. electromagnets," IEEE Trans. Magn., vol. 26, No. 2, pp. 1046-1049, March 1990.
[3] 2Y. Kawase, O. Miyatani, T. Yamaguchi, and S. Ito, "Numerical analysis of dynamic characteristics of electromagnets using 3D finite element method with edge elements," IEEE Trans. Magn., vol. 30, pp. 3248-3251, September, 1994.
[4] 3Y. Kawase, O. Miyatani, K. Iawashita, T. Kobayashi, and K. Suzuki, "3-D Finit element analysis of dynamic characteristics of electromagnet with permanent-magnets," IEEE Trans. Magn., vol. 42, pp. 1339-1342, April, 2006.
[5] M. Bartsch, and T. Weiland, "2D and 3D Calculation of forces," IEEE Trans. Magn., vol. 30, pp. 3467-3470, September, 1994.
[6] I. Popa, A-I. Dolan, "Static Force Characteristic of E-Type Single Phase AC Electromagnets," International Conference on Applied and Theoretical Electricity (ICATE 2014), Craiova, 2014, pp. 1-5.
[7] *** http://www.quickfield.com, QuickField, Finite Element Analysis System, Version 6.3, User's Guide.