

PROCEEDINGS

Numerical Simulation of Electromagnetic Field of Non-Contact LVDT by the Smoothed Finite Element Method

Qiuxia Fan^{1,*}, Jianyu Li¹ and Xinqi Zhang¹

¹School of Automation and Software Engineering, Shanxi University, Taiyuan, 030006, China

*Corresponding Author: Qiuxia Fan. Email: anqiuxia0808@126.com

ABSTRACT

In this paper, a series of smoothed finite element methods for the electromagnetic field distribution of non-contact LVDT are proposed. Firstly, the problem domain is discretized into a set of four-node tetrahedral elements, and the linear shape function is used to interpolate the domain variables. Then, the smooth region is further constructed by combining the nodes, edges and surfaces of the unit. Gradient smoothing technique is used to smooth the magnetic vector potential and scalar potential on each smooth domain. Based on the generalized smooth Galerkin weak form, the discretization system expression is derived and the discretization equations are established. By comparing the numerical simulation with the experimental results, the feasibility and effectiveness of the smooth finite element electromagnetic field analysis method are verified.

KEYWORDS

LVDT; smoothed finite element method; gradient smoothing technique

Funding Statement: The authors received no specific funding for this study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.



This work is licensed under a Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.