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Force Computation using Parameterized Mesh Generator

S. Krishanakumar[1],S. R. H. Hoole[2]

[1]Department of Physical Science, Faculty of Applied Science, Vavuniya Campus, University of Jaffna, Sri Lanka
[2]Department of Electrical and Electronic Engineering, Faculty of Engineering, University of Peradeniya, Sri Lanka

sabakrish@gmail.com[1],srhhoole@gmail.com[2]

The magnetic forces acing on movable components of an object are computed by a variety of methods. The computation methodology is based on the application of the virtual work principle. The virtual work principle is far better compared to Maxwell's tensor method. The force computation can be obtained in two methods. In the first method, the difference in stored energy is computed based on the finite difference method. The other method was developed using first and second order derivatives of any integral quantity with respect to the parameter of motion of a part. The second method, however, involves matrix inversion in the expression for force computation and therefore, though computationally accurate, is a little expensive. These methods can be applied for higher order finite element analysis with greater accuracy and efficiency. In these methods, however the computation of derivatives with finite element is difficult. On the other hand, in generally, the first method may introduce important numerical errors in the final results. As a part moves, the mesh topology will produce new connectivity of nodes and it produces numerical error in the second solution. But if we move any nodes of the movable body elastically, the continuity of the energy function will be preserved and it will reduce numerical error. A new algorithm for moving mesh and various movement of an object (parameterized mesh generator) without changing the mesh topology is considered. In this paper, we implemented this algorithm with the finite difference method in magnetic force computing and tested it for a relay model.