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NUMERICAL ANALYSIS OF EDDY CURRENT IN AN ASYMMETRICAL CONDUCTOR USING THE NEW 3D EQUIVALENT MAGNETIC CIRCUIT NETWORK METHOD

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Most papers concerning the calculation of 3D eddy current problems are using a combination of a vector potential and a scalar potential to solve the electromagnetic field. This paper proposes a new time stepping EMCN method, which can analyze the eddy current in 3D using only scalar potential. Additional variables like electric vector potential are not needed to be introduced in the method. In this method, the analysis model is divided into hexahedral elements and then EMCN is constructed by connecting each element. Also, the MMF due to the induced currents are added as passive sources in the network. So, by using only scalar potential at each node, it is possible to model eddy currents and analyze its characteristics in 3-dimensions.

In order to verify the effectiveness of the proposed method, the eddy current fields in an asymmetrical conductor with a hole is analyzed. Figuare 1 shows the analysis model and the eddy current distribution inside conductor. The calculated value compared with FE analysis result and mesured value are shown Fig.2. The EMCN result show a good agreement with FE and measured values results.