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3P46 - Lorentz Force Eddy Currents for Nondestructive Testing

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Nondestructive testing (NDT) is a growing need to test the integrity of industrial materials since small defects can lead to catastrophic failure during operation in areas ranging from aviation to nuclear pressure vessels. Lorentz force eddy currents provide higher testing speed and greater penetration depth of conductive non-ferrous metals than other methods. This presentation assesses the effectiveness of using a 2D finite element model (FEM) of a permanent magnet with a copper coil probe using Ansys Maxwell to assess the feasibility of this approach. The FEM model enables the analysis of defects that are difficult to replicate physically and the translation of probe data into a computer simulated visualization of real defects. It also allows for testing various materials and external environments, such as vacuum or air under different conditions. We report the validation and verification of the 2D FEM model to analytic results and experimental data of known defects. Extensions to 3D FEM and more complicated defects will be discussed.

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