

Boundary Element Method for Multiply Connected Domains

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Abstract—Two procedures in the boundary element method (BEM) for multiply connected domains are reported. The first procedure introduces cuts such that the multiply connected domain is transformed into a simply connected one, so that it allows the use of the scalar potential. Each cut introduces an additional term containing the “hall” current multiplied by the solid angle under which the cut is seen. The second procedure is based on a novel magnetic vector potential formulation. It uses edge elements and tree-cotree spanning. A zero normal component of this vector potential A and the condition for its line integral along any closed path on the boundary are imposed, such that the continuity of the normal component of the magnetic flux density be rigorously satisfied. The unknowns are the tangential components of $\nabla \times A$ and the tree edge element values.

Index Terms – Boundary element method, scalar and vector magnetic potential, edge elements, tree-cotree techniques.