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XFEM ANALYSIS OF TWO-DIMENSIONAL LAPLACE EQUATION WITH INCLINED SLIT BOUNDARIES

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In this paper, a technique of the XFEM which can analyze 2D Laplace equation with slit type boundaries of arbitrary inclination angle is proposed. In this technique, the complex potential in potential flow theory is used. For a complex number *z* and a constant *n*, the power function $f(z) = z^n = (x+iy)^n$, which is a kind of the conformal mapping, shows a flow around a corner of the angle of π/n. Thus, it shows the flow around a corner of a semi-infinite plate in case of $n = 1/2$. Therefore, in the proposed technique, the real part of this potential $f(z) = z^{1/2}$ is used for enrich function, and the corresponding enriched nodal degree of freedom works as the velocity of the flow around the corner.

In the proposed technique, geometry of the defect or slit type boundary is not explicitly expressed on the orthogonal grid type FEM mesh. Accuracy of this proposed technique was verified by the numerical example of magnetostatic field analysis, and the magnetic flux distribution around an inclined defect obtained by the proposed technique showed good agreement with that from FEM analysis.

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