THE A – φ FINITE ELEMENT METHOD WITH COMPOSITE GRIDS
FOR A TRANSIENT EDDY CURRENT PROBLEM

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Abstract. The A – φ finite element method with fine and coarse grids (composite grids) is
presented to solve a transient eddy current problem. In this method, some local domains with
which are concerned can be handled conveniently by using the fast adaptive composite grid
method (FAC). An optimal error estimate of the corresponding approximation has been ob-
tained. To solve the discrete A-φ system in the global domain efficiently, we design an iteration
which combines FAC with classic steepest descent. We prove that this method converges with
a bounded rate independent of the mesh sizes.

Keywords: Transient eddy current problem, Composite grid, A – φ FEM, Error estimate,
Iteration algorithm

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