

**A ROBUST FEM-BEM MINRES SOLVER FOR DISTRIBUTED
MULTIHARMONIC EDDY CURRENT OPTIMAL CONTROL PROBLEMS
IN UNBOUNDED DOMAINS***

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Abstract. This work is devoted to distributed optimal control problems for multiharmonic eddy current problems in unbounded domains. We apply a multiharmonic approach to the optimality system and discretize in space by means of a symmetrically coupled finite and boundary element method, taking care of the different physical behavior in conducting and non-conducting subdomains, respectively. We construct and analyze a new preconditioned MinRes solver for the system of frequency domain equations. We show that this solver is robust with respect to the space discretization and time discretization parameters as well as the involved “bad” parameters like the conductivity and the regularization parameters. Furthermore, we analyze the asymptotic behavior of the error in terms of the discretization parameters for our special discretization scheme.

Key words. time-periodic optimization, eddy current problems, finite element discretization, boundary element discretization, symmetric coupling, MinRes solver.

AMS subject classifications. 49N20, 35Q61, 65M38, 65M60, 65F08

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