

**Some Optimal Control Problems of Electromagnetic Fields in Multiply
Connected Conductors**

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Abstract: We consider the optimal control of low-frequency electromagnetic fields in a time-harmonic setting. For the state equation, a non-standard H -based formulation of the equations of electromagnetism is used for multiply connected conductors. The magnetic field H in the conductor is obtained from an elliptic equation with the $\operatorname{curl}\sigma^{-1}\operatorname{curl}$ -operator, while the $\operatorname{div}\mu\nabla$ -operator is set up for a potential in the isolator. Both equations are coupled by appropriate interface conditions. In all problems, the control is the electrical current in the conducting domain. Several types of control functions are discussed, in particular, the problem of sparse optimal control. Special emphasis is laid on the discussion of the strong form of adjoint equations.

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