

# Topology optimization of electric machines based on topological sensitivity analysis

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Topological sensitivities are a very useful tool for determining optimal designs. The topological derivative of a domain-dependent functional represents the sensitivity with respect to the insertion of an infinitesimally small hole. In the gradient-based ON/OFF method, proposed by N. Takahashi in 2005, sensitivities of the functional with respect to a local variation of the material coefficient are considered.

We show that, in the case of a linear state equation, these two kinds of sensitivities coincide. For the sensitivities computed in the ON/OFF method the generalization to the case of a nonlinear state equation is straightforward, whereas the computation of topological derivatives in the nonlinear case is ongoing work.

We will show numerical results obtained by applying the ON/OFF method in the nonlinear case to the optimization of an electric motor.

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