Coupled Calculation of Electromagnetic Fields and Stationary Temperature Distributions,
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Designing accelerator components often affords the study of its electro- or magneto-thermal behaviour. A consistent numerical method is presented for the coupled calculation of electromagnetic fields and the steady state heat distribution. The conversion of electric energy into heat plays an important role in many accelerator applications. As examples we can think of rf-windows, cavity cooling or inductive soldering. This paper treats the heat conduction in steady state. The underlying mathematical problem equals Poisson's equation and is therefore formally identical to that of electrostatics or stationary currents. Consequently, the same numerical methods can be adopted to the stationary temperature problem. The static module S of the program package MAFIA has been extended about the computation of stationary temperature distributions. As heat sources one may choose a material with a defined temperature, a heat source of defined heat density respectively heat emission. Especially heating by wall losses of resonant modes in cavities or heating by induced eddy currents can be computed easily.