Local wellposedness of quasilinear Maxwell equations on domains

Roland Schnaubelt[1], **Martin Spitz**[2,*]

[1]*Department of Mathematics, Karlsruhe Institute of Technology*

[2]*Department of Mathematics, University of Bielefeld*

[*]Email: `mspitz@math.uni-bielefeld.de`

In this talk we study the macroscopic Maxwell equations on domains with perfectly conducting and absorbing boundary conditions as well as the Maxwell interface problem. Equipped with instantaneous material laws the Maxwell equations lead to a first order quasilinear system. We develop a local wellposedness theory in H^m for all $m \geq 3$. First we construct a unique solution of the nonlinear system assuming that the initial value, the inhomogeneity, and the boundary value satisfy certain compatibility conditions. We then characterize the case of a finite maximal existence time by a blow-up condition in the Lipschitz norm and show the continuous dependence on the data. Our construction relies on the wellposedness theory for linear nonautonomous Maxwell equations, which we derive using energy-type H^m-estimates and several regularization techniques. Since the Maxwell system has characteristic boundary, we also have to exploit the structure of the Maxwell equations to avoid a loss of regularity.