

Finite Elements in Electromagnetics- *hp* Approximations and Fast Solvers.

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Electromagnetic problems are governed by Maxwell's equations. Applications are wide ranging and include radar, medical imaging, land mine detection and electromagnetic compatibility problems to name a few. In electromagnetic problems, one is typically faced with trying to determine the electromagnetic fields inside or surrounding geometrically complex objects made up of a variety of different materials. This in turn leads to singularities at material interfaces and sharp corners.

A firm mathematical foundation is key to the accurate modelling of electromagnetic problems by the finite element method. This talk will discuss the special types of finite elements that are required to accurately solve problems in electromagnetics. Particular attention will be to the *hp* version of the finite element method which combines both *h* (mesh) refinement with *p* (polynomial) enrichment. Recent work relating to efficient preconditioning and fast solvers will also be presented.