

Recent Developments in Finite Element Methods for Electromagnetic Problems

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Abstract — In this talk I will present a selection of recent developments in the field of computational electromagnetics, focusing on finite element methods and related computational tools. Using the open-source environment ONELAB (<http://onelab.info>), I will show how fast-converging high-order discretizations can be used to reach high-accuracy solutions, how cohomology basis functions can be computed to solve complex field-potential problems in three dimensions, and how optimized domain decomposition methods can be applied to solve extreme-scale problems on massively parallel computers. Hands-on demonstrations will be given on practical examples, including e.g., the modeling of twisted superconducting fibers.

Keywords (Index Terms) — Finite element methods, computation, electromagnetics.