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van Rienen, Ursula, Universität Rostock, Germany; Clemens, Markus, Weiland, Thomas, Technische Universität Darmstadt, Germany

Efficient Algorithms in Electromagnetic Field Computation

Electromagnetic field computation often affords the numerical solution of large sparse linear systems. The character of the system matrices ranges from real, symmetric, positive (semi-)definite to complex, non-Hermitian, indefinite. For practical applications these systems have of the order of up to millions of unknowns. The use of recently developed numerical algorithms allows for a remarkable improvement in efficiency of numerical field simulations. A brief overview about the basic ideas of different iterative solution methods is given focused mainly on Krylov-subspace methods. Comparisons are presented for these methods illustrating the enormous increase in efficiency for several practical applications. Some videos on the error behaviour and development of the solution will be shown.