Computational aspects of nano-optics

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Abstract

The research field of plasmonics has experienced a significant growth owing to tremendous advances in laser technologies and material fabrication below the subdiffraction regime. Notwithstanding recent applications of nano-optics materials, the general question of how electromagnetic radiation interacts with materials and, most importantly, how dynamical radiation excitation governs optical properties of various structures remains open. I will discuss the computational side of the research showing several applications such as subdiffraction metal gratings and nonlinear nano-optical materials. I will also introduce a general Maxwell-Bloch formalism that allows simple and yet precise *ab initio* description of optical properties of nanoscale systems.