



Electromagnetic boundary conditions: from matched waves to unexpected resonances

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To solve electromagnetics problems, the partial differential equations for electric and magnetic field functions have to be supplemented by boundary conditions at the surface bounding region of the domain, in order to make the solutions for the given problem unique. For interfaces between different materials, often the interface conditions are approximated by boundary conditions which makes the approach to the solution easier because at least one degree of inhomogeneity can be removed.

Hence, boundary conditions constitute an inseparable part of electromagnetic problems. The most common boundary conditions that are used in the literature, are perhaps the “classical” perfect electric conductor (PEC) and perfect magnetic conductor (PMC) boundaries, as well as various impedance boundaries. However, a plethora of classes of other interesting and useful conditions exists, and has been studied over the past years in our group. These go under abbreviations like PEMC [1,2], DB [3,4], D’B’ [5], SHDB [6], GSHDB [7], etc.

In the talk, I will discuss certain interesting phenomena associated with electromagnetic waves interacting with certain boundary conditions, like matched waves in connection with planar boundaries [7], and sharp resonance structures for small scatterers characterized by impedance surface [8].

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