

On novel properties of multimode boundary conditions in electromagnetism and their consequences

J.M.L. BERNARD¹

ABSTRACT

In electromagnetism, a plane composed of an homogeneous planar substrate on a perfectly reflecting plane can be modelled by boundary layer method as a surface boundary condition with normal derivatives of high order. We will show that, in case of metamaterial substrate having a permittivity and a permeability with negative real parts, the roots of the characteristic equation have exceptional positions in complex plane, which implies particular properties of the field for point source (dipole) illumination. New closed form expressions of the field will be presented which exhibit these properties, due in particular to the presence of branch cuts in the solution [1]. Numerical examples will be also presented.

References

- [1] J.M.L. BERNARD, On the expression of the field scattered by a multimode plane. accepted for publication in QJMAM (see prepublication site of CMLA)

¹CEA-DIF, DAM, 91297 Arpajon
and LRC MESO, CMLA, ENS Cachan, 61 av. du Prés. Wilson, 94235,
France
`jean-michel.bernard@cea.fr`