The Einstein-Maxwell equations with thin layers of polarized or magnetized matter

Guillermo A. González

Grupo de Investigación en Relatividad y Gravitación, Escuela de Física, Universidad Industrial de Santander, A. A. 678, Bucaramanga 680002, Colombia
guillermo.gonzalez@saber.uis.edu.co

ABSTRACT

The Einstein-Maxwell equations for material media when there is a thin layer of polarized or magnetized matter are presented. By taking for the energy-momentum tensor of polarized or magnetized matter the expression presented in [1–3], and using the formalism of tensorial distributions [4–6], discontinuity conditions through the thin layer of matter are obtained. These conditions are expressed as relations between the jumps of the electromagnetic potential and field with the surface polarization-magnetization tensor. By requiring also that the electromagnetic energy-momentum tensor will be free of quadratic singular distributions, additional compatibility conditions electromagnetic potential and the surface polarization-magnetization tensor. Finally, the physical implications of the obtained conditions are analyzed.

References

[1] R. A. Grot and A. C. Eringen, Int. J. Engng. Sci. **4**, 639 (1966).

[2] G. A. Maugin, Ann. Inst. Henri Poincaré **15**, 275 (1971).

[3] G. A. Maugin, J. Math. Phys. **19**, 1198 (1978).

[4] A. Papapetrou and A. Hamouni, Ann. Inst. Henri Poincaré **9**, 179 (1968).

[5] A. Lichnerowicz, C.R. Acad. Sci. **273**, 528 (1971).

[6] A. H. Taub, J. Math. Phys. **21**, 1423 (1980).