
Null Hypersurfaces in Spacetimes with Certain Symmetries

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Abstract:

This work is concerned with the study of the geometry of null hypersurfaces in spacetimes with certain symmetries. The main drawback of studying null hypersurfaces is the degeneracy of the induced metric. This degeneracy makes it impossible to study them in the framework of standard submanifolds theory. Hence, to deal with this difficulty, specific techniques and tools were developed. In this work, we use the rigging technique, and firstly, we study normalized null hypersurfaces in Brinkmann spacetimes with special attention paid to Plane Fronted Waves. For instance, we prove that there are no compact null hypersurfaces in Plane Fronted Waves for which the local H-factor has a sign. We study also the geometry of null hypersurface in Lorentzian manifolds furnished with a conformal rigging field. We prove for instance that an Einstein null hypersurface in Lorentzian manifolds of quasi-constant curvature for which the closed conformal rigging vector field is a curvature vector field, is locally a product of null curves, Euclidean spaces, and spheres. [\[1\]](#)[\[2\]](#)[\[3\]](#)[\[4\]](#)[\[5\]](#)[\[6\]](#)[\[7\]](#)[\[8\]](#)[\[9\]](#)[\[10\]](#).

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