

The Study of Non-expanding Plebański–Demiański Solutions

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ABSTRACT

The Plebański–Demiański class of solutions describes spacetimes of algebraic type D with an aligned non-null electromagnetic field and a cosmological constant [1], [2]. When the repeated principal null directions have non-zero expansion, it describes generalized black holes with rotation, acceleration, charges, NUT parameter and possibly non-zero cosmological constant. We study the complementary non-expanding case of Plebański–Demiański metric [3], which has not received as much attention as its expanding counterpart. Minkowski, de Sitter and anti-de Sitter spacetimes in Plebański–Demiański coordinates [4] are studied as a background for a more general subcase of Plebański–Demiański metric, so-called B -metrics by the classification of Ehlers and Kundt [5]. A possible physical interpretation of the B -metrics is that they describe gravitational field of a tachyon; in a sense, they are counterparts of the Schwarzschild black hole solution [6], [7].

References

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