General Relativity and Quantum Cosmology

Complete classification of second-order symmetric spacetimes

O F Blanco, M Sánchez, J M M Senovilla

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As a difference with the positive-definite Riemannian case, in the Lorentzian case there exists proper second-order symmetric spacetimes, i.e., those with vanishing second covariant derivative of the Riemannian tensor ($R_{\lambda\mu\nu\rho;\alpha;\beta}=0$) which are not locally symmetric ($R_{\lambda\mu\nu\rho;\alpha}\neq 0$). In fact, they lie in the class of Brinkmann metrics, and include some known plane waves. Our purpose is to classify these spacetimes in the 4 dimensional case.

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