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Premetric teleparallel theory of gravity and its local and linear constitutive law

Abstract

We continue to investigate the premetric teleparallel theory of gravity (TG) with the coframe (tetrad) as gravitational potential. We start from the field equations and a local and linear constitutive law. We create a Tonti diagram of TG in order to disclose the structure of TG. Subsequently we irreducibly decompose the 6th order constitutive tensor under the linear group. Moreover, we construct the most general constitutive tensors from the metric and the totally antisymmetric Levi-Civita symbol, and we demonstrate that they encompass nontrivial axion and skewon type pieces. Using these tools, we derive for TG in the geometric-optics approximation propagating massless spin 0, 1, and 2 waves, including the special case of Einstein's general relativity.

References: Itin, Hehl, Obukhov, Phys. Rev. D 95, 084020 (2017), arXiv: 1611.05759. Itin, Obukhov, Boos, Hehl, submitted to EPJC (Aug 2018). Earlier references can be found there.