

On exact solutions to quadratic gravity

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ABSTRACT

Quadratic gravity arises by adding corrections quadratic in the curvature to the Einstein-Hilbert action. Corresponding field equations are considerably more involved than the Einstein equations and as a result very few exact solutions are known, mostly various generalizations of pp-waves with traceless Ricci tensor of type N. We prove that in quadratic gravity under quite general assumptions, the traceless Ricci tensor of type N or III implies that the spacetime is Kundt, explaining thus in retrospect why virtually all known exact solutions in quadratic gravity are Kundt. We also present examples of new Kundt and non-Kundt vacuum solutions. We also show that static spherically symmetric non-Schwarzschild vacuum black hole in quadratic gravity, recently discovered by Lu, Perkins, Pope, and Stelle using numerical methods, is conformal to Kundt and show how this simplifies mathematical description of the problem. This talk is based on joint works with J. Podolský, V. Pravda and R. Švarc [1, 2].

References

- [1] V. Pravda, A. Pravdová, J. Podolský, and R. Švarc, *Exact solutions to quadratic gravity*, *Phys. Rev.* **D95** (2017) 084025.
- [2] J. Podolský, V. Pravda, A. Pravdová, and R. Švarc, in preparation (2017)