

# Decoupling and Exact Solutions of Einstein Equations in Almost Kähler Variables

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**Abstract:** We prove that the Einstein equations written in almost Kähler variables have a decoupling property which allows us to construct solutions in very general forms following methods elaborated in Refs. [1]. Such generic off-diagonal metrics are determined by corresponding classes of generating and integration functions depending, in general, on all space-time coordinates. The almost Kähler variables are important for performing deformation and A-brane quantization of Einstein gravity and elaborating noncommutative generalizations [2] and constructing quantum corrections to solutions. We study geometric criteria when generic off-diagonal solutions a) define Lorenz manifolds and satisfy the Cauchy problem; b) generate solitonic hierarchies and model geometric Ricci flows of low dimensional geometries on four dimensional spacetime manifolds. There are considered extensions of the method for constructing exact solutions in modified theories of gravity (for instance, with extra dimensions, with scaling anisotropy and/or generalized Lagrange–Finsler spaces). Finally, we provide examples and speculate on new classes of physically important solutions and discuss geometric methods of their quantization.

1. S. Vacaru, *Int. J. Geom. Meth. Mod. Phys.* **8** (2011) 9, arXiv: 0909.3949v1; *Int. J. Theor. Phys.* **49** (2010) 2753, arXiv: 1003.0043v1; **4** (2007) 1285, arXiv: 0704.3986
2. S. Vacaru, *Int. J. Geom. Meth. Mod. Phys.* **6** (2009) 873, arXiv: 0810.4692; *J. Geom. Phys.* **60** (2010) 1289, arXiv: 0709.3609; *Acta Applicandae Mathematicae* **110** (2010) 73, arXiv: 0810.0707; *J. Math. Phys.* **50** (2009) 073503, arXiv: 0806.3814; *Class. Quant. Grav.* **27** (2010) 105003, arXiv: 0907.4278