

CLASSIFICATION OF REDUCED EQUATIONS FOR THE EIKONAL EQUATION

Vasyl Fedorchuk

Institute of Mathematics, Pedagogical University, Cracow, Poland; Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, Ukr. Nat. Acad. Sci., Lviv, Ukraine,
Email: vafed@gmail.com

Volodymyr Fedorchuk

Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, Ukr. Nat. Acad. Sci., Lviv, Ukraine,
Email: volfed@gmail.com

ABSTRACT

We study a connection between structural properties of low-dimensional nonconjugate subalgebras of the Lie algebra of the generalized Poincaré group $P(1, 4)$ and results of symmetry reduction for the eikonal equation. We plan to present some results concerning the relationship between the classification of one-, two-, and three-dimensional nonconjugate subalgebras of the Lie algebra of the group $P(1, 4)$ and types of symmetry reductions for the eikonal equation.

References

- [1] Lie S. *Zur allgemeinen Theorie der partiellen Differentialgleichungen beliebiger Ordnung*, Leipz. Berichte, I. 53. (Reprinted in Lie, S., *Gesammelte Abhandlungen*, Vol. 4, Paper IX.)
- [2] Ovsiannikov L.V. *Group Analysis of Differential Equations*, Academic Press, New York, 1982.
- [3] Olver P.J. *Applications of Lie Groups to Differential Equations*, Springer-Verlag, New York, 1986.
- [4] Fushchich W.I., Barannik L.F., and Barannik A.F. *Subgroup Analysis of Galilei and Poincaré Groups and Reduction of Nonlinear Equations*, Naukova Dumka, Kiev, 1991.
- [5] Fushchych W.I., Shtelen W.M., Serov N.I. *Symmetry Analysis and Exact Solutions of Equations of Nonlinear Mathematical Physics*, Dordrecht, Kluwer Academic Publishers, 1993.
- [6] Grundland A.M., Harnad J. and Winternitz P. *Symmetry reduction for nonlinear relativistically invariant equations* // *J. Math. Phys.*, **25** (1984) 791–806.
- [7] Vasyl Fedorchuk. *Symmetry Reduction and Exact Solutions of the Euler–Lagrange–Born–Infeld, Multidimensional Monge–Ampère and Eikonal Equations* // *Symmetry in nonlinear mathematical physics*, Vol.1 (Kiev, 1995). *J. Nonlinear Math. Phys.*, **2** (1995) 329–333.
- [8] Fedorchuk V.M. *Symmetry reduction and some exact solutions of a nonlinear five-dimensional wave equation* (In Ukrainian) // *Ukrain. Mat. Zh.*, **48** (1996) 573–576; *translation in Ukrainian Math. J.* **48**(1996) 636–640 (1997).
- [9] Nikitin Anatoly G. and Kuriksha Oksana. *Group analysis of equations of axion electrodynamics* // *Group Analysis of Differential Equations and Integrable Systems*, 152–163, Department of Mathematics and Statistics, University of Cyprus, Nicosia, 2011.
- [10] Nikitin A.G., Kuriksha O. *Invariant solutions for equations of axion electrodynamics* // *Commun. Nonlinear Sci. Numer. Simulat.* **17**, (2012), 4585–4601.
- [11] Fedorchuk V.M., Fedorchuk V.I. *On classification of the low-dimensional non-conjugate subalgebras of the Lie algebra of the Poincaré group $P(1, 4)$* (In Ukrainian) // *Proceedings of Institute of Mathematics of NAS of Ukraine*, **3** (2006) 302–308.
- [12] Vasyl Fedorchuk and Volodymyr Fedorchuk. *On Classification of Symmetry Reductions for the Eikonal Equation* // *Symmetry* 2016, **8**(6), 51; doi:10.3390/sym8060051.