

# Classical symmetries of ordinary differential equations related to stationary integrable partial differential equations

*Ivan Tsyfra*

AGH University of Science and Technology, Krakow, Poland

We study the relationship between the solutions of stationary integrable partial differential equations and coefficients of the second-order ordinary differential equations invariant with respect to one-parameter Lie transformation group. The classical symmetry method is applied. We prove that if the coefficients of ordinary differential equation satisfy the stationary integrable Calogero-Bogoyavlenskii-Shiff equation with two independent variables then the ordinary differential equation is integrable by quadratures. If special solutions of integrable partial differential equations are chosen, then the coefficients satisfy the stationary KdV equations. It was shown that the Ermakov equation belong to a class of these equations. In the framework of the approach we obtained the similar results for generalized Riccati equations. By using operator of invariant differentiation we describe a class of higher order ordinary differential equations for which the group-theoretical method enables us to reduce the order of ordinary differential equations.