Title: The Zermelo conditions and higher order homogeneous functions

Author(s): Zbyněk Urban and Demeter Krupka

Invariance under reparametrizations of integral curves of higher order differential equations, including variational equations related to Finsler geometry, is studied. The classical homogeneity concepts are introduced within the theory of (jet) differential groups, known in the theory of differential invariants. On this basis the well-known generalizations of the Euler theorem are obtained (the Zermelo conditions). It is shown that every integral curve of a system of differential equations whose left-hand sides are higher order positive homogeneous functions, is invariant with respect to all reparametrizations, i.e. a set solution. Then the positive homogeneity concept is applied to second order variational equations. We show that the systems with positive homogeneous Lagrangians are defined by positive homogeneous functions, and vice versa.

Address:
Zbyněk Urban
Department of Mathematics and Physics
Faculty of Electrotechnics and Informatics
University of Pardubice
Studentska 95, 532 10 Pardubice
Czech Republic

Address:
Demeter Krupka
School of Mathematics
Beijing Institute of Technology
5 South Zhongguancun Street, Haidian Zone
Beijing 100081
China