

EQUIVALENCE AND INVARIANTS OF SCALAR VARIATIONAL PROBLEM OF HIGHER ORDER

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This is the joint work with Igor Zelenko. We consider the geometry and equivalence problem of scalar Lagrangians $f(x, y, y', \dots, y^{(n)}) dx$ of order $n \geq 3$ viewed modulo contact transformations, divergence and multiplication to a non-zero constant. We show that this equivalence problem coincides with the equivalence problem of some subclass of rank two vector distributions.

Using the recently developed geometry of rank 2 vector distributions, we construct of the canonical coframe naturally associated with each such variational problem. In particular, we show that all maximally symmetric non-degenerate Lagrangians are equivalent to $(y^{(n)})^2 dx$. We also discuss the correspondence between symmetries and invariants of the variational problem, the associated rank 2 vector distribution, and the corresponding Euler–Lagrange equation.