Piotr Mormul ***:jets spaces, Cartan distribution and applications in sub-riemannian geometry***

1. Jets spaces $J^k(n, m)$ and their canonical contast systems C (also called Cartan distributions).
   1.1 Particular Cases: space $J^k(1, m)$ of order k jets in space of dimension $m \geq 1$.
   1.2 Special properties od sequences of derived systems of Cartan in $J^k(1,m)$ (flags of distributions).

2. Classical Cartan prolongations (case $m = 1$, corresponding to successive order jets of functions) and generalization (case $m > 1$, of sucessive order jets of curves). Structural of Cartan prolongations.

3. « Monster » manifold M^k_m, or compactification of jet spaces $J^k(1,m)$ from Cartan prolongations. Distributions Δ^k_m on these « monster » manifolds which at the same time extend Contact systems C on $J^k(1,m)$ et have a full of typical singularites.

4. Detailed analysis of the caes $m = 1$ (which come from Engel, von Weber and E. Cartan. ...)
   4.1 Critical curves (vertical et tangential curves) drawn on M^1_m.
   4.2 Stratification of spaces M^1_m in classes (R,V,T) which generalizes at the same time results obtained by Kumpera-Ruiz and Jean.
   4.3 Sub-riemannian geometry of distributions Δ^k_1 , in particular for $k = 2$ and $k = 3$.
   4.4 General questions of Liu-Sussmann ([LS]) and Montgomery ([M]) on eventual non-smoothness, for minimizing sub-riemannian curves.
   4.5 Non smooth abnormal extremals which are non-minimizing in dimension 6 from [LS].
   4.6 Non smooth abnormal extremals which are non-minimizing for sub-riemaniann geometry on Δ^3_1 in dimension 5.
   4.7 In search an anwser « yes » to the question in 4.4.

5.Kinematic modelling of « monster » manifolds for $m = 1$ (car with trailers)
and for $m = 2$ (train in th espace in dimension 3).

BIBLIOGRAPHY
[AS] Agrachev, Sachkov; 2004.
[BH] Bryant, Hsu; Invent. mathem., 114 (1993).
[J] Jean; ESAIM:COCV 1 (1996).
[LS] Liu, Sussmann; Memoirs AMS # 564 (1995).
[M] Montgomery; 2002.
[MZ] Montgomery, Zhitomirskii: Memoirs AMS # 956 (2010).