Plan

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My research area is 「Geometry of differential systems」. We continue to study this direction. My plan consists of the following two research themes.

1. Differential systems with symmetries.

Among differential systems, there exist systems which have rich symmetries (automorphisms). As a such a typical category, we can give 「Parabolic geometry」. Roughly speaking, parabolic geometries (in the sense of N.Tanaka) are geometries associated with simple graded Lie algebra $\mathfrak{g}$ over $\mathbb{R}$ or $\mathbb{C}$, where these graded algebras are defined by the discussion of (restricted) roots of $\mathfrak{g}$:

$$\mathfrak{g} = \mathfrak{m} \oplus \mathfrak{p}, \qquad (\mathfrak{p} : \text{parabolic subalgebra}).$$

Then, our research objects are corresponding geometric structures of manifolds M (dim M =dim G/P) which have the model geometry on compact quotient G/P. For these objects, there exists the invariant theory (i.e. Tanaka theory) consisting of Cartan connections and their curvatures. We want to give deep results of these geometries based on this theory.

2. Reduction for differential systems.

In the research of geometry of differential systems, the problem for constructing solutions (i.e. integral manifolds) for given differential systems is very important. Because, this problem is equivalent to the problem to solve partial differential equations describing interested phenomenons in mathematical physics. Namely, this problem is nothing but quadrature for differential systems. Traditionally, for achievement of this purpose, the theory of reduction by using quotient fibrations by covariant systems (ex, Cauchy characteristic systems, Monge characteristic systems) has been used. Utilizing this approach, the problem of quadrature can be reduced into the lower dimensional space. We reconsider these methods and develop the theory of reduction from the modern viewpoint.