Computing Symmetry Lie Algebras of CR-manifolds

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Applications of differential algebra for computing symmetry Lie algebras associated to arbitrary systems of (partial or ordinary) differential equations are well-known and extensively studied in the recent years. One of the main reasons of such a wide applications is the linearity of the so-called *determining equations* arising among the computations that provides some appropriate circumstances in order to employ certain techniques of differential algebra.

However, development of suitable mathematical theory and computational algorithms for computing symmetry Lie algebras of CR-manifolds has legged far behind the well-studied and well-understood situation of differential equations. That is while in the both kinds of computations, one encounters somehow similar determining equations at least in the sense that they are identically linear. Nevertheless in the case of CR- manifolds, the mentioned determining equations admit some *complex* differential equations that convert them to more complicated forms. Thus, to proceed the corresponding computations of symmetry algebras of CR- manifolds one has to extend techniques of differential algebra to the com- plex space and to equip them with some new relevant techniques and methods.

In this lecture, we talk about computing symmetry algebras of CR- manifolds, providing general formulas for the explicitation of the concerned pde systems of determining equations and finally about employing differential computer algebra tools - mostly within the Maple package `DifferentialAlgebra` - in order to automate the handling of the arising highly complex linear systems of determining equations.