

## Local Reduced Forms of Systems of Linear Functional Equations and Applications

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Moser and super-irreducible forms play a central role in the local analysis (and hence in the global study) of linear systems of differential or difference equations. Algorithms for constructing such forms have been developed and implemented in the Maple package ISOLDE. In this talk, we shall explain how these concepts can be extended to the general class of *systems of pseudo-linear equations* which comprises common types of systems such as linear differential, difference or  $q$ -difference systems. For this we first introduce a unifying framework that permits us to treat, simultaneously, all types of linear functional systems. This is done by using the language of pseudo-linear derivations over a field of discrete valuation. We derive a definition of regularity and develop a method for recognizing regular systems inspired by Moser's work on differential equations.

As an application we shall show that the approach we developed in the past for computing formal series solutions for differential and difference systems is also applicable for  $q$ -difference systems.

This talk is based on a recent joint work with E. Pfluegel and G. Broughton