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Differential algebraic groups and their applications  

Abstract: 

At the most basic level, differential algebraic geometry studies solution spaces of systems of differential polynomial equations. If a matrix group is defined by a set of such equations, one arrives at the notion of a linear differential algebraic group, introduced by P. Cassidy. These groups naturally appear as Galois groups of linear differential equations with parameters. Studying linear differential algebraic groups and their representations is important for applications to finding dependencies among solutions of differential and difference equations (e.g., transcendence properties of special functions). This study makes extensive use of the representation theory of Lie algebras. Remarkably, via their Lie algebras, differential algebraic groups are related to Lie conformal algebras, defined by V. Kac. We will discuss these and other aspects of differential algebraic groups, as well as related open problems.