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Schwarz maps of algebraic linear ordinary differential equations

Abstract: In differential algebra, given a linear ordinary differential equation with rational coefficients, Kovacic type algorithms produce a fundamental system of solutions in closed form. This algorithm first identifies the differential Galois group of the equation by means of the rational first integrals, and then uses this information to describe the solutions in terms of antiderivatives (i.e. functions with rational derivatives) and hyperexponentials (i.e. functions with rational logarithmic derivatives). In order two, when the solutions to the equation are all algebraic, the most efficient way of describing its solutions is relying on a classical result from F. Klein that states that these type of equations are pullbacks of hypergeometric linear differential equations. This classical result has been recently generalized by M. Berkebosch for order three, and by me for general order, by introducing the concept of standard equation: linear ordinary differential equations with only algebraic solutions are pullbacks of standard equations. In this talk I will show how, by studying the Schwarz map of linear ordinary differential equation, one can generate all standard equations.