

## DIFFERENTIAL RESULTANTS, A DIFFERENTIAL ELIMINATION TOOL

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Differential resultant problems were first studied for differential operators by Ore (1932), Berkovich and Tsirulik (1986), Chardin (1991), Carra'Ferro (1994) and Li (1995). The differential resultant of two differential polynomials in one variable was studied by Ritt (1932), under some hypothesis on the differential polynomials. It was G. Carra'Ferro, who gave the definition of a differential resultant for a set of  $n$  ordinary differential polynomials in  $n - 1$  differential variables (1997). The differential resultant defined by Carra'Ferro is based on the algebraic resultant of Macaulay, and for generic differential polynomials it can be computed as a quotient of two determinants.

Apparently forgotten for some years, Carra'Ferro's differential resultant of a set of partial differential operators (1994) was used by Kasman and Previato (2001,2010). The differential resultant for differential polynomials was used recently by Rueda and Sendra (2010) to approach the linear ordinary differential implicitization problem. We defined linear complete differential resultants and we used them to compute the implicit equation of a set of linear differential polynomial parametric equations (linear DPPEs). Also recently, Gao et al. gave a more complete definition of the (sparse) differential resultant of  $n$  differential polynomials in  $n - 1$  variables (in terms of the generalized differential Chow form), suggesting a revival of the subject (of differential resultants in general). We may say that the theory of differential resultants is rather incomplete and offers a wide field of research, in many different directions regarding its definition and its computation.