

Symbolic Solution of Differential Equations

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We present the algebro-geometric method for computing explicit formula solutions for algebraic differential equations (ADEs), as described in [1]. An algebraic differential equation is a polynomial relation between a function, some of its partial derivatives, and the variables in which the function is defined. Regarding all these quantities as unrelated variables, we get an algebraic solution hypersurface; i.e., a hypersurface on which the solutions are to be found. Parametrizations of the solution hypersurface are closely related to solutions of the ADE.

This approach is relatively well understood for rational, algebraic, and power series solutions of single algebraic ordinary differential equations (AODEs). First steps are taken towards a generalization to other types of solutions and to partial differential equations.

Keywords

algebraic ODEs, symbolic solution, parametrization

References

[1] S. FALKENSTEINER, J.J. MITTERAMSKOGLER, J.R. SENDRA, F. WINKLER, The Algebro-Geometric Method: Solving Algebraic Differential Equations by Parametrization. *Bulletin (New Series) of the American Mathematical Society* **60**(1), 85–122 (2023).