

# My differential equation has nested radicals of polynomials as coefficients

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The basic idea of the so-called algebro-geometric approach for determining solutions of algebraic differential equations is to assign an algebraic variety to the differential equation(s) to afterwards derive information on the solutions from the properties of the algebraic variety. If the coefficients of the equations are polynomials in the independent variables, the associated underlining variety is natural. But, how can we proceed if the coefficients are now nested radicals of polynomials? In this talk we will recall some basic facts on radical varieties, and we will present an algorithm to transform, if possible, a given ODE or PDE with radical function coefficients into one with rational coefficients by means of a rational change of variables so that solutions correspond one-to-one.

The main ideas presented in this talk have been jointly elaborated with my colleagues J. Caravantes, D. Sevilla, and C. Villarino and appear in the paper [*J. Caravantes, J.R. Sendra, D. Sevilla, C. Villarino. Transforming ODEs and PDEs from radical coefficients to rational coefficients. Mediterranean Journal of Mathematics (2021) 18:96 <https://doi.org/10.1007/s00009-021-01703-x>.*]