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Title:	Solutions of First Order Differential Equations in Iterated Strongly Normal Extensions
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Abstract:	Let k be a differential field of characteristic zero with an algebraically closed field of constants C. This thesis concerns the problem of finding transcendental solutions of first order (nonlinear) differential equations in an iterated strongly normal extension of k. We deduce the structure of intermediate differential subfields of iterated strongly normal extensions of k that have transcendence degree one. We also produce a family of differential equations with no transcendental solutions in any iterated strongly normal extension of k. We show that if a first order differential equation has a transcendental solution in an iterated strongly normal extension of k, then there can only be a maximum of three k−algebraically independent solutions. We end the thesis with a conjecture regarding the algebraic dependence of solutions of a first order differential equation. We give an independent proof of the fact that every intermediate subfield of a Picard-Vessiot extension is a solution field if and only if the differential Galois group has solvable identity component. This result is then used to give the structure of intermediate differential subfields of a Picard-Vessiot extension whose differential Galois group is connected and solvable. We analyse transcendental liouvillian solutions of first order differential equations y 0 = a n y n +· · ·+a 0 , where a i k. In which case, the number of algebraic solutions is finite. We deduce a relation between the algebraic and the transcendental solutions. We also show that if a differential equation has a transcendental solution in an exponential extension then the differential equation can be written in terms of the algebraic solutions. When k = C(x) with x 0 = 1, we provide a method of obtaining transcendental solutions in an exponential extension of C(x).
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