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Authors: Singh, Jagdeep (/jspui/browse?type=author&value=Singh%2C+Jagdeep)

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Abstract: In my thesis I have read and understood Professor Michael Singer's proof of the Fano's theorem on linear homogeneous differential equations. In his paper "Algebraic Relations Among Solutions of Linear Differential Equations: Fano's Theorem" (see [12]), Singer proves the following theorem: For $n \leq 6$ if there are n -linearly independent solutions y_1, \dots, y_n of a linear differential equation of order n , over a differential field with an algebraically closed field of constants C , satisfying a non zero homogeneous polynomial over C then all the solutions of the differential equation can be expressed as an algebraic combination of solutions of linear differential equations of order less than n . Furthermore, he proves the existence of differential equations of order n for each $n \geq 7$ such that: 1. there are n linear independent solutions satisfying the relation $y_1^2 + \dots + y_n^2 = 0$ and that 2. there is a solution which cannot be obtained using algebraic combinations of solutions of linear homogeneous differential equations of lower order than n . This theorem of Singer (see chapter 5) is the meat of this thesis. For the reader's convenience, I have included considerable amount of Picard-Vessiot theory (see chapters 1, 2 and 4) and basic theorems from the theory of algebraic groups needed (see chapters 3 and 6) to understand this theorem of Singer.


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