LIOUVILLIAN EXTENSIONS AND THE GALOIS THEORY OF LINEAR DIFFERENTIAL EQUATIONS

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ABSTRACT. Let F be a differential field and let E be a differential field extension of F with no new constants. We say that E is a *liouvillian extension* of F if there is a tower of differential field extensions

$$F = F_0 \subset F_1 \subset F_2 \cdots \subset F_n = E$$

such that $F_i = F_{i-1}(\mathbf{x}_i)$ where $\mathbf{x}_i' \in F_{i-1}$ or $\frac{\mathbf{x}_i'}{\mathbf{x}_i} \in F_{i-1}$ or $\mathbf{x}_i$ is algebraic over F_{i-1}. In this talk, we will study the structure of certain class of liouvillian extensions and discuss the role it plays on the Galois theory of linear differential equations and on the theory of integration in finite terms.

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