1077-34-831 **Ainhoa Aparicio-Monforte**, **Elie Compoint** and **Jacques-Arthur Weil***
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Constructive approaches to Kovacic's reduced forms of linear differential systems.

Consider a linear differential system $[A]$: $Y' = AY$ with coefficients in a differential field k. Let $Lie(G)$ denote the Lie algebra of the differential Galois group G of $[A]$. Kovacic and Kolchin showed that, via a gauge transformation, one can transform $[A]$ to an equivalent system $[B]$: $Z' = BZ$ with the property that $B \in Lie(G)(\overline{k})$. A system with this property is said to be in reduced form. When a system is in reduced form, one can read immediately the properties of the Lie algebra $Lie(G)$. In this talk, I will discuss recent constructive approaches to this result. For example, when G is reductive and unimodular, the system $[A]$ is in reduced form if and only if all of its invariants (rational solutions of appropriate symmetric powers) have constant coefficients (instead of rational functions). I will also focus on reducible systems, such as those appearing as variational equations in Hamiltonian mechanics, to show how one can design reduction algorithms in this case and progress towards methods to compute the Lie algebra $Lie(G)$ directly. (Received September 13, 2011)