

# Hilbert's 16th problem. When variational principles meet differential systems (Part II)

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We provide an upper bound for the number of limit cycles that polynomial differential systems of a given degree may have. The bound turns out to be a polynomial of degree four in the degree of the system. Under suitable conditions the technique is applicable to general smooth differential systems as well. It brings together those two areas of Analysis implied in the title, by transforming the task of counting limit cycles into counting critical points for a certain smooth, non-negative functional for which limit cycles are zeros. We thus solve the second part of Hilbert's 16th problem providing a uniform upper bound for the number of limit cycles which only depends on the degree of the polynomial differential system.