

Polynomials, Invariants and Computer Algebra

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My talk deals with invariants of binary forms of degree 7. Binary forms are homogeneous polynomials in two variables with complex coefficients. We denote by R_d the ring of invariants of binary forms of degree d . People studied intensively the structure of R_d in the 19th century, trying to answer the question “Is the ring R_d finitely generated over \mathbb{C} for any d ?”. David Hilbert answered this question with his two brilliant papers published in 1890 and 1893: “YES”. However, until today, people were able to give a system of generators for R_d only for a few cases: for $d \in \{2, \dots, 6\}$ and for $d = 8$. The last case ($d = 8$) was solved by Shioda in 1967. We describe in the talk the way we constructed a system of generators for R_7 , combining old methods with new (powerful) tools: Computer Algebra systems and new results in Invariant Theory.