

Integral and differential methods in invariant theory

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Resumo

We start by commenting on what are called the first and second fundamental problems of invariant theory (Weyl's nomenclature). The first deals with the question of the finite generation of the algebra of invariants of the action of a group in an affine algebra; the second deals with the finite generation of the ideal of the relations between those generators. Hilbert solved the second problem completely (Hilbert's basis theorem) and the first in some special cases (using differential methods originated in the work of Cayley) and Hurwitz solved other cases as for example the action of the unitary group (using integral methods). Both worked together at Königsberg and these results were obtained at the end of the XIX century.

Weyl (in the 1930s) continued Hurwitz ideas and solved the first problem for all semi-simple groups and Nagata proved in 1964 that there are counterexamples to the general solution of the first problem.

We will finish by mentioning two lines of results (joint work with Rittatore): one consists in generalizing the integral methods (following Mumford's ideas) and the second generalizing the differential methods "à la" Cayley.