Separating invariants for multisymmetric polynomials

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This talk is dedicated to joint results with Gregor Kemper and Fabian Reimers on separating invariants for the ring of multisymmetric polynomials in $m$ sets of $n$ variables over an arbitrary field $F$. We prove that in order to obtain separating sets it is enough to consider polynomials that depend only on $\left\lfloor \frac{n}{2} \right\rfloor + 1$ sets of these variables. This improves a general result by Máté Domokos about separating invariants. In addition, for $n \leq 4$ we explicitly give minimal separating sets (with respect to inclusion) for all $m$ in case $\text{char}(F) = 0$ or $\text{char}(F) > n$. Moreover, in the case of the finite field $F = F_2$ we give an explicit minimal separating set (with respect to inclusion) for multisymmetric polynomials.

Working over a finite field $F_q$ with $q$ elements we determine the minimal number of separating invariants for the invariant ring of a matrix group $G \leq \text{GL}_n(F_q)$ over the finite field $F_q$. We show that this minimal number can be obtained with invariants of degree at most $|G| n(q-1)$. In the non-modular case this construction can be improved to give invariants of degree at most $n(q-1)$. 