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Bideterminants for Schur Superalgebras

We will review classical results regarding bideterminants for Schur algebras, the structure of their simple modules and the process of modular reduction. Afterwards, we will define Schur superalgebra $S(m|n,r)$ and its $\mathbb{Z}$-form $S(m|n,r)_{\mathbb{Z}}$, and discuss bideterminants for Schur superalgebras over a field of characteristic zero.

Then we will solve a problem of Muir and describe a $\mathbb{Z}$-form of a simple $S(m|n,r)$-module $D_{\lambda,\mathbb{Q}}$ over the field $\mathbb{Q}$ of rational numbers, under the action of $S(m|n,r)_{\mathbb{Z}}$. This $\mathbb{Z}$-form is the $\mathbb{Z}$-span of modified bideterminants $[T_\ell : T_i]$. Finally, we will prove that each $[T_\ell : T_i]$ is a $\mathbb{Z}$-linear combination of modified bideterminants corresponding to $(m|n)$-semistandard tableaux T_i.

(joint work with Alexandr N. Zubkov)