

A simpler generating set of the De Concini–Procesi ideals

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Abstract

To any nilpotent matrix of size n we associate a partition $\lambda = (\lambda_1, \lambda_2, \dots, \lambda_\ell)$ of n , where the λ_i are the sizes of the blocks of its Jordan normal form; let C_λ denote the conjugacy class of such a matrix.

We are interested in the schematic intersection of $\overline{C_\lambda}$ with the set of all diagonal matrices, whose defining ideal we denote by \mathcal{I}_λ and call the *De Concini–Procesi ideal* of λ . De Concini and Procesi produced a generating set for \mathcal{I}_λ , and proved that the quotient ring of \mathcal{I}_λ (where λ' is the conjugate of λ), as a representation of the symmetric group S_n , is isomorphic to the induction of the trivial representation of the Young subgroup S_λ . This ideal has been further studied by Tanisaki, Eisenbud, and Weyman, among others. We describe a simpler generating set for \mathcal{I}_λ . When λ is a hook partition, our generating set is minimal, and has a structure that allows us to compute its minimal free resolution using relatively basic algebraic techniques.

Joint work with Riccardo Biagioli and Sara Faridi.