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A generalization of the Murnaghan-Nakayama rule for K-k-Schur and k-Schur functions

Duc-Khanh Nguyen

Okinawa Institute of Science and Technology, Japan

khanh.mathematic@gmail.com

The K-k-Schur functions and k-Schur functions appeared in the study of K-theoretic and affine Schubert Calculus as polynomial representatives of Schubert classes. In this paper, we introduce a new family of symmetric functions $\mathcal{F}_\lambda^{(k)}$, that generalizes the constructions via the Pieri rule of K-k-Schur functions and k-Schur functions. Then we obtain the Murnaghan-Nakayama rule for the generalized functions. The rule is described explicitly in the cases of K-k-Schur functions and k-Schur functions, with concrete descriptions and algorithms for coefficients. Our work recovers the result of Bandlow, Schilling, and Zabrocki for k-Schur functions, and explains it as a degeneration of the rule for K-k-Schur functions. In particular, many other special cases and connections promise to be detailed in the future.