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Springer numbers and Arnold families revisited

Tung-Shan Fu

National Pingtung University

tsfu@mail.nptu.edu.tw

Abstract

For the calculation of Springer numbers (of root systems) of type B_n and D_n , Arnold introduced a signed analogue of alternating permutations, called β_n -snakes, and derived recurrence relations for enumerating the β_n -snakes starting with k . The results are presented in the form of double triangular arrays $(v_{n,k})$ of integers, $1 \leq |k| \leq n$. An Arnold family is a sequence of sets of such objects as β_n -snakes that are counted by $(v_{n,k})$. As a refinement of Arnold's result, we give analogous arrays of polynomials, defined by recurrence, for the calculation of the polynomials associated with successive derivatives of $\tan x$ and $\sec x$, established by Hoffman. Moreover, we provide some new Arnold families of combinatorial objects that realize the polynomial arrays, which are signed variants of André permutations and Simsun permutations. This is joint work with Sen-Peng Eu.