Multiplicative and additive determinantal inequalities for totally nonnegative matrices

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Abstract

Totally positive matrices are matrices in which each minor is positive. Lusztig extended the notion to reductive Lie groups. He also proved that specialization of elements of the dual canonical basis in representation theory of quantum groups at $q = 1$ are totally non-negative polynomials. Thus, it is important to investigate classes of functions on matrices that are positive on totally positive matrices. I will discuss several sources of such functions. One has to do with multiplicative determinantal inequalities (joint work with M. Gekhtman). Another deals with certain partial sums of Plucker relations (joint work with P. K. Vishwakarma). The third source deals with majorizing monotonicity of symmetrized Fischer's products which are a natural generalization of Hadamard-Fischer inequalities. Majorizing monotonicity of symmetrized Fischer's products was already known for hermitian positive semidefinite case which brings additional motivation to verify if they hold for totally positive matrices as well (joint work with M. Skandera). The main tools we employed are network parametrization, Temperley-Lieb and monomial trace immanants.