

Schur Positivity and the q -Log-convexity of the Narayana Polynomials

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Abstract: Using Schur positivity and the principal specialization of Schur functions, we provide a proof of a recent conjecture of Liu and Wang on the q -log-convexity of the Narayana polynomials, and a proof of the second conjecture that the Narayana transformation preserves the log-convexity. Based on a formula of Brändén which expresses the q -Narayana numbers as the specializations of Schur functions, we derive several symmetric function identities using the Littlewood-Richardson rule for the product of Schur functions, and obtain the strong q -log-convexity of the Narayana polynomials and the strong q -log-concavity of the q -Narayana numbers.

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Keywords: q -log-concavity, q -log-convexity, q -Narayana number, Narayana polynomial, lattice permutation, Schur positivity, Littlewood-Richardson rule

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