

1135-33-3100 **Ira M. Gessel*** (gessel@brandeis.edu). *Rational functions with nonnegative power series coefficients*. Preliminary report.

Mourad E. H. Ismail and M. V. Tamhankar [A combinatorial approach to some positivity problems, SIAM J. Math. Anal. 10 (1979), 478–485] proved, by applying MacMahon’s Master Theorem to a 3×3 matrix, that for $0 \leq \lambda \leq 1$ the coefficient of $x^l y^m z^n$ in

$$\frac{1}{1 - (1 - \lambda)x - \lambda y - \lambda xz - (1 - \lambda)yz + xyz}$$

is nonnegative. They expressed this coefficient, when nonzero, as a positive number times the square of an alternating sum. Easy consequences of this result are the nonnegativity of the coefficients of $(1 - x - y - z + 4xyz)^{-1}$ and $(1 - 2x - 2y - 2z + 3xy + 3xz + 3yz)^{-1}$. The nonnegativity of the latter series was proved by G. Szegő in 1933.

I will discuss a multivariable generalization of Ismail and Tamhankar’s result that applies MacMahon’s Master Theorem to matrices of arbitrary size. (Received September 26, 2017)