A real version of Suffridge's convolution theorem and a converse of Newton's inequalities

Martin Lamprecht

A sequence $(a_k)_{k=0}^n$ of real numbers is called log-concave if

$$a_k^2 \geq a_{k+1}a_{k-1} \qquad \text{for all} \qquad k = 1, \ldots, n-1.$$

Log-concave sequences appear frequently in such diverse fields as Algebra, Combinatorics, Geometry, Probability, and Statistics, and it is often a difficult problem to check whether a certain sequence is log-concave or not. One important sufficient condition for log-concavity are *Newton's inequalities*:

$$\text{If all zeros of } F(z) = \sum_{k=0}^{n} \binom{n}{k} a_k z^k \text{ are real, then } (a_k)_{k=0}^n \text{ is log-concave.}$$

Newton's inequalities are, however, far from being a necessary condition for log-concavity. Nevertheless, in my talk I will show how a real version of a convolution theorem of Suffridge from 1974 leads to a converse of Newton's inequalities.