

Combinatorics of Truncated Partition Theorems

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In 2012, Andrews and Merca derived a truncated version of Euler's pentagonal number theorem, which yields the following partition inequalities: For $k \geq 1$ and $n \geq 1$,

$$(-1)^{k-1} \sum_{j=0}^{k-1} (-1)^j \left(p\left(n - \frac{j(3j+1)}{2}\right) - p\left(n - \frac{(j+1)(3j+2)}{2}\right) \right) \geq 0,$$

where $p(N)$ denotes the partition function.

The work of Andrews and Merca has opened up a new study on truncated theta series inspiring several mathematicians to work on truncated theta series. In this study, analytic and combinatorial methods have been equally instrumental, but it seems hard to identify any common thread that runs through all existing combinatorial proofs. Recently, Ernest Xia and Xiang Zhao found several new identities on truncated series, which motivated me to study the whole phenomenon from a combinatorial point of view. In this talk, I will present some ideas and progress.

Keywords

Integer partitions, overpartitions, pod partitions, theta series, truncated series