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Asymptotics for the partial fraction decomposition of the restricted partition generating function.

Let $p_N(n)$ denote the number of partitions of n into at most N parts. These restricted partitions have generating function

$$\sum_{n=0}^{\infty} p_N(n)q^n = \prod_{j=1}^N \frac{1}{1-q^j}$$

with partial fraction decomposition

$$\prod_{j=1}^N \frac{1}{1-q^j} = \sum_{\substack{0 \leq h < k \leq N \\ (h,k)=1}} \sum_{\ell=1}^{\lfloor N/k \rfloor} \frac{C_{hkl}(N)}{(q - e^{2\pi i h/k})^\ell}.$$

The limit of the coefficients $C_{hkl}(N)$ as $N \rightarrow \infty$ has been the subject of conjectures of Rademacher (1973) and more recently Sills and Zeilberger (2013). In this talk we describe the latest results on the behavior of $C_{hkl}(N)$ for large N and connections with the dilogarithm function. (Received August 08, 2013)