

Parity consideration in Rogers-Ramanujan-Gordon type overpartition

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In 2010, Andrews considered a variety of parity questions connected to classical partition identities of Euler, Rogers, Ramanujan and Gordon. As a large part of his paper, Andrews considered the partitions by restricting the parity of occurrence of even numbers or odd numbers in the Rogers - Ramanujan - Gordon type partitions. The Rogers-Ramanujan-Gordon partition was defined by Gordon in 1961 as a combinatorial generalization of the Rogers-Ramanujan identities with odd moduli. In 1974, Andrews derived an identity which can be considered as the generating function counterpart of the Rogers-Ramanujan-Gordon theorem, and since then it has been called the Andrews-Gordon identity. By revisiting the Andrews-Gordon identity, Andrews extended his results by considering some additional restrictions involving parities to obtain some Rogers-Ramanujan-Gordon type theorems and Andrews-Gordon type identities. In the end of his paper, Andrews posed 15 open problems. Most of Andrews' 15 open problems have been settled, but the 11th that "extend the parity indices to overpartitions in a manner" has not. In 2013, Chen, Sang and Shi derived the overpartition analogues of the Rogers-Ramanujan-Gordon theorem and the Andrews-Gordon identity. In this paper, we shall define two kind of Rogers-Ramanujan-Gordon type overpartitions which involving parity considerations. Moreover, we shall give the generating function in the infinite product form according to the parity of the parameters.