Abstract

Let $q$ be a prime power and $a$ be a positive integer such that $a \geq 2$. Assume that there is a Steiner $3-(a + 1, q + 1, 1)$ design. For every $v$ satisfying certain arithmetic conditions we can construct a Steiner $3-(va^d + 1, q + 1, 1)$ design for every $d$ sufficiently large. In the case of block size 6, when $q = 5$, this theorem yields new infinite families of Steiner 3-designs: if $v$ is a given positive integer satisfying the necessary arithmetic conditions, then for every non-negative integer $m$ there exists a Steiner $3-(v(4 \cdot 5^m + 1)^d + 1, 6, 1)$ for sufficiently large $d$. 