

Almost resolvable when duplicated Steiner triple systems

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In a Steiner triple system of order v ($\text{STS}(v)$), a parallel class is a set of mutually disjoint triples that covers each point, and an almost parallel class (APC) is a set of mutually disjoint triples that covers all but one point of the system. A landmark result of design theory states that for every $v \equiv 3 \pmod{6}$ there is an $\text{STS}(v)$ which can be partitioned into parallel classes. When $v \equiv 1 \pmod{6}$, an $\text{STS}(v)$ has no parallel class, and furthermore cannot be partitioned into APCs, but various alternatives have been considered in the literature. We show that there exists an $\text{STS}(v)$ that has a set of APCs such that each triple of the system occurs in exactly two APCs if and only if $v \equiv 1 \pmod{6}$ and $v \geq 19$.