Abstract

It is well known that for any Steiner triple system (STS) one can define a binary operation $\cdot$ upon its base set by assigning $x{\cdot}x = x$ for all x and $x{\cdot}y = z$, where z is the third point in the block containing the pair $\{x, y\}$. The same can be done for Mendelsohn triple systems (MTS), directed triple systems (DTS) as well as hybrid triple systems (HTS), where (x, y) is considered to be ordered. In the case of STSs and MTSs the operation yields a quasigroup, however this is not necessarily the case for DTSs and HTSs. A DTS or an HTS which induces a quasigroup is said to be *Latin*. The quasigroups associated with STSs and MTSs satisfy the flexible law $x \cdot (y \cdot x) = (x \cdot y) \cdot x$ but those associated with Latin DTSs and Latin HTSs need not. A DTS or an HTS is said to be pure if when considered as a twofold triple system it contains no repeated blocks. This thesis focuses on the study of Latin DTSs and Latin HTSs, in particular it aims to examine flexibility, purity and other related properties in these systems. Latin DTSs and Latin HTSs which admit a cyclic or a rotational automorphism are also studied. The existence spectra of these systems are proved and enumeration results are presented. A smaller part of the thesis is then devoted to examining the size of the centre of a Steiner loop and the connection to the maxi-Pasch problem in STSs.