

1086-17-2091 **Kelly C Aman*** (kelly.aman@mavs.uta.edu). *Simplifying Knuth Cubical Arrays for Semifields.*

Semifields are finite dimensional vector spaces over finite fields with non-associative vector multiplication. There are clearly only a finite number of isomorphism classes of semifields of any given order, but this number quickly grows too large to warrant investigation, as there are 376971 non-isomorphic semifields of order 64, and even more for higher orders. For this reason, the published results regarding semifields have focused on isotopism classes instead of isomorphism classes (there are only 332 non-isotopic semifields of order 64). Unfortunately, isotopic semifields can have vastly different algebraic properties, such as a commutative semifield being isotopic to a non-commutative semifield.

Clearly, a method for studying the isomorphism classes of semifields is needed. Knuth's cubical arrays provide a powerful tool for studying semifields and their isomorphisms, but are somewhat complicated and difficult to fully understand. By mapping each element of the vector space to an integer, we can simplify the cubical array into a matrix which is immediately useful for performing semifield multiplication, and can be used to study the isomorphism classes of semifields. (Received September 24, 2012)