Representing Sugihara monoids with binary relations

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Abstract

Sugihara monoids can be defined as commutative idempotent distributive residuated lattices with an order-reversing involution. These algebras are used as algebraic semantics for certain relevance logics. We will consider Sugihara monoids as algebras in the more general class of distributive involutive FL-algebras (DInFL-algebras). Our first result is to extend the so-called generalised ordinal sum construction (Galatos 2005) from residuated lattices to DInFL-algebras. Then, combining our generalised ordinal sum construction with a method for representing DInFL-algebras, we prove that every finite Sugihara chain is representable as an algebra of binary relations. Lastly, we use ultraproducts to show that every Sugihara monoid is representable in this way. (Joint work with Wilmari Morton and Claudette Robinson.)