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On semigroups with basic complex algebra

Semigroups with a basic complex algebra can be characterized algebraically in several different ways. One such is that they have a homomorphism to a commutative inverse semigroup inducing the semisimple quotient. Consequently computing multiplicities of irreducible constituents reduces to the case of a commutative inverse semigroup. This can be handled combinatorially using Mobius inversion on the semilattice of idempotents and inner product formulas for abelian groups. Consequently the spectrum of a Random Walk on any such semigroup can be explicitly computed. This generalizes results of Ken Brown and others.