

# State operators on bounded residuated $\ell$ -monoids

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States on algebras of many valued and fuzzy logics, such as *MV*-algebras, *GMV*-algebras, *BL*-algebras, pseudo *BL*-algebras and bounded residuated  $\ell$ -monoids (*Rℓ*-monoids, in short), are analogues of probability measures. Flaminio and Montagna (2007, 2009) introduced state *MV*-algebras as *MV*-algebras with a unary operation, an internal state, satisfying some basic properties of states. Di Nola and Dvurečenskij (2009) presented a stronger variation of state *MV*-algebras called state-morphism *MV*-algebras. Rachůnek and Šalounová (2010) introduced state *GMV*-algebras and state-morphism *GMV*-algebras which need not be commutative. Ciungu, Dvurečenskij and Hyčko (2010) recently presented state *BL*-algebras and state-morphism *BL*-algebras.

We present state *Rℓ*-monoids and state-morphism *Rℓ*-monoids as a (non-commutative) generalization of the mentioned algebras.