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On (bi) linked group congruences on (bi) linked semigroups

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Abstract
In this paper we introduce the notion of (bi) linked group congruence on a (bi) linked semigroup. Inclusion preserving bijection between the set of all (bi) linked group congruences and the set of all dense k-ideals has firstly been obtained. Subsequently these results have been refined to lattice isomorphisms. For a linked semigroup (S, T, f) (bi-linked semigroup (S, T, f, g)) with the left operator semiring L and the right operator semiring R there correspond six lattices *viz.*, the lattice $\mathcal{GC}(S)$ ($\mathcal{BGC}(S)$) of all linked group congruences on (S, T, f) (respectively, bi-linked group congruences on (S, T, f, g)), the lattice $\mathcal{I}(S)$ of all dense k-ideals of (S, T, f), the lattice $\mathcal{RC}(L)$ of ring congruences on L, the lattice $\mathcal{I}(L)$ of dense k-ideals of L, the lattice $\mathcal{RC}(R)$ of ring congruences on R, the lattice $\mathcal{I}(R)$ of dense k-ideals of R. Any two of these lattices have been shown to be isomorphic. Modularity, distributivity and completeness of these lattices have also been investigated. Finally the least (bi) linked group congruence on a (bi) linked semigroup has been identified under a suitable restriction.

Keywords Linked semigroup · Bi-linked semigroup · Operator semirings of linked semigroup · Linked group congruence · Dense k-ideal · Bi-linked group congruence

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