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On the lattice of quasi-filters of left congruence on simple inverse semigroups

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Throughout this paper S is always a multiplicative semigroup with 0 and 1. The terminologies and definitions not given in this paper can be found in [1-5].

Denoted by $Con(S)$ the set of all left congruence on S.

An inverse semigroup S is a semigroup in which every element $x$in S has a unique inverse y in S in the sense that $x = xyx$ and $y = yxy$.

Definition 1. A quasi-filter (see [**5**]) of S is defined to be subset $\mathcal{E}$ of $Con(S)$ satisfying the following conditions:

1. If $\rho \in \mathcal{E}$ and $\rho \subseteq \tau \in Con(S)$, then $\tau \in \mathcal{E}$.
2. $\rho \in \mathcal{E}$ implies $(\rho : s) \in \mathcal{E}$ for every $s \in S$.
3. If $\rho \in \mathcal{E}$ and $\tau \in Con(S)$ such that $(\tau : s), (\tau : t)$ are in $\mathcal{E}$ for every $(s, t) \in \rho$, then $\tau \in \mathcal{E}$.

Denoted by $S - q - fil$ the lattice of quasi-filters of left congruence on S.

The unique minimal element in $S - q - fil$ is $\omega = S \times S$ and the unique maximal element is $\mathcal{E}_{\triangle_S}$, which contains $\triangle_S$, when $\triangle_S = \{(s, s) | s \in S\}$. Also we call a quasi-filter $\mathcal{E}$ trivial if either it contains $\triangle_S$ or only contains ω.

Theorem 1. *Let S is simple inverse semigroup. Then the lattice of $S - q - fil$ has no trivial quasi-filter if S has normal subgroups form a infinite chain under the set inclusion.*

References

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