

Topological graph inverse semigroups

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We investigate a topologization of graph inverse semigroups and polycyclic monoids. In particular, we characterise graph inverse semigroups which admit only discrete locally compact semigroup topology. This characterization provide a complete answer on the question of Z. Mesyan, J. D. Mitchell, M. Morayne and Y. H. Péresse posed in [2].

We shall say that a graph inverse semigroup $G(E)$ satisfies the condition (\star) if for each countable subset $A = \{x_n\}_{n \in \mathbb{N}} \subset \text{Path}(E)$ there exists an infinite subset $B = \{x_{n_k}\}_{k \in \mathbb{N}} \subset A$ and an element $\mu \in G(E)$ such that $\mu \cdot x_{n_k} \in \text{Path}(E)$ and $|\mu \cdot x_{n_k}| > |x_{n_k}|$, for each $k \in \mathbb{N}$. Each graph inverse semigroup $G(E)$ over a finite graph E satisfies the condition (\star) (see [2, Lemma 9]).

Theorem 1. *Discrete topology is the only locally compact semigroup topology on the graph inverse semigroup $G(E)$ if and only if $G(E)$ satisfies the condition (\star) .*

REFERENCES

- [1] Serhii Bardyla. On a locally compact topological graph inverse semigroups. preprint (<http://arxiv.org/abs/1706.08594>), 2017.
- [2] Mesyan-Mitchell-Morayne-Peresse-2013. Topological graph inverse semigroups. *Topology and its Applications*, 208, 106–126, 2016.