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# Embedding locally inverse semigroups into Rees matrix semigroups

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**Abstract**

We give a necessary and sufficient condition for a locally inverse semigroup to be embeddable into a Rees matrix semigroup over a generalized inverse semigroup.

**Keywords:** Inverse semigroup, Rees matrix semigroup
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## 1 Introduction

For the standard notions and notation in semigroup theory the reader is referred to [1]. In particular the set of idempotents of a semigroup $S$ will be denoted by $E(S)$, the set of inverses of an element $s \in S$ by $V(s)$. For nonempty subsets $H, K \subseteq S$, $HK$ denotes the usual product of subsets.

**Definition 1.1.** A regular semigroup is called locally inverse if the submonoid $eSe$ is an inverse subsemigroup of $S$, for all $e \in E(S)$. If in addition $E(S)$ is a subsemigroup of $S$, then $S$ is called a generalized inverse semigroup. In this case $E(S)$ is a normal band, i.e. an idempotent semigroup satisfying the equation $xyzx = xzyx$.

**Definition 1.2.** On a regular semigroup $S$, a partial order relation $\leq$ is defined by $s \leq t$, if $s = et = tf$, for some $e, f \in E(S)$. It is called the natural partial order. A regular semigroup is locally inverse, if and only if the natural partial order is compatible with the multiplication.

**Definition 1.3.** An order ideal $H$ of a regular semigroup $S$, is a nonempty subset $H$ of $S$, such that $x \leq h$ implies $x \in H$, for all $h \in H$. For $s \in S$ we shall use the notation $[s] = \{x \in S : \ x \leq s\}$. In any locally inverse semigroup $S$ the equality $[s][t] = [st]$ holds, for all $s, t \in S$.

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