



INTRODUCTION

Dense subsemigroups of semigroups of certain types were studied by Hall in [1] and by Higgins in [2]. In [1], some necessary conditions of dense subsemigroups of inverse semigroups were introduced. Characterization of dense subsemigroups of semilattices of groups, completely simple semigroups and 0-rectangular bands were given by Higgins in [2]. In the same paper, Higgins gave a necessary and sufficient condition of a set X such that S has a proper dense subsemigroup where S is one of the following transformation semigroups:

- (i) the partial transformation semigroup on X ,
- (ii) the full transformation semigroup on X ,
- (iii) the symmetric inverse semigroup on X .

Transformation semigroups are considered important in the field of semigroups. This research is a continuation of Higgins's work concerning transformation semigroups. The aim of this research is to characterize some other well-known transformation semigroups having proper dense subsemigroups. In fact, matrix semigroups are transformation semigroups. Some certain matrix semigroups are studied relating to existence of their proper dense subsemigroups.

The preliminaries and notation used for this work are given in Chapter I. We study in Chapter II whether each of the following semigroups has a proper dense subsemigroup: free semigroups, free groups, cyclic semigroups, cyclic groups.

Chapter III and Chapter IV are the main results of the thesis. In Chapter III, we characterize some well-known transformation

semigroups which have proper dense subsemigroups. In Chapter IV, we give a sufficient condition of a field F that allows some certain well-known matrix semigroups over F having a proper dense subsemigroup. We also give in this chapter a significant necessary condition of a field F such that one of those matrix semigroups has a proper dense subsemigroup.



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