

EIGENSTRUCTURE SPECIFICATION IN HILBERT SPACE*B.M.N. Clarke***INTRODUCTION**

The solution of the problem of spectrum assignment by linear state feedback for linear finite dimensional systems, is by now a classical result of linear systems theory. The proof was first given in [14]. A statement of the problem and its solution is to be found in good texts on linear systems theory [1], [11]. In the main, the proofs rely on a transformation of the original linear system into a canonical form, wherein the effect of the feedback matrix on the closed loop characteristic polynomial is directly apparent. If the system is completely controllable, it is shown that the coefficients of the characteristic polynomial of the canonical form of the closed loop system, may be arbitrarily specified by choice of the feedback matrix.

There has been recent interest in this problem for infinite dimensional state spaces [2], [3], [4], [9], [10]. In [9], [10] for systems described by a class of linear hyperbolic partial differential equations, an approach analagous to the finite dimensional treatment described above has been adopted. That is, a transformation to a canonical form and a choice of feedback to assign the spectrum of the canonical form. We have two main criticisms to make of this approach. Firstly, it does not seem readily adaptable to other classes of infinite dimensional linear systems which are of interest. Secondly, the feedback constructed