EIGENSTRUCTURE SPECIFICATION VIA STATE BOUNDARY FEEDBACK
FOR LINEAR SYSTEMS IN HILBERT SPACE

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Recently Clarke and Holland [1] investigated the problem of eigen-structure specification for linear systems in Hilbert space with Distributed Control. By the construction of a spectral representation of the closed loop system it was shown that spectral specification is possible under certain critical conditions depending on the dimension of the control space being sufficiently large in relation to the dimension of the eigen-spaces of the linear system operator, and, subject to an asymptotic condition on the closed loop spectrum.

In this paper the same spectral specification problem is investigated but with Boundary Control rather than Distributed Control. This is an important problem since, in practice, it is often more practical to exert control by means of the boundary conditions, particularly for systems governed by linear partial differential equations [2]. Fattorini [3] deter-mined certain controllability conditions by replacing the Boundary Control by Distributed Controls which have the same effect on the system and then applying known results for distributed parameter systems. This method has been further pursued by Curtain [4] and is the underlying approach used here also.

Invoking Fattorini's controllability result it is shown that the possibility of spectral specification again depends critically on the dimension of the control space being sufficiently large in relation to the dimension of the eigenspaces of the linear system operator. However,