



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

In this dissertation, we characterize nearly invariant subspaces of finite defect for the backward shift operator acting on the vector valued Hardy space. Using this characterization we completely describe the almost invariant subspaces for the shift and its adjoint acting on the vector valued Hardy space. Moreover, as an application, we also identify the kernel of perturbed Toeplitz operator in terms of backward shift-invariant subspaces in various important cases using our characterization in connection with nearly invariant subspaces of finite defect for the backward shift operator acting on the vector valued Hardy space.

Going further, in this report, we briefly describe nearly T^{-1} invariant subspaces with finite defect for a shift operator T of finite multiplicity acting on a separable Hilbert space \mathcal{H} in terms of backward shift invariant subspaces of finite defect in vector valued Hardy spaces. We also provide the representation of nearly T_B^{-1} invariant subspaces with finite defect in a scale of Dirichlet-type spaces \mathcal{D}_α for $\alpha \in [-1, 1]$ for a finite Blaschke product B .

Finally, this dissertation deals with the study of *Schmidt* subspaces in vector valued Hardy spaces. More precisely, *Schmidt* subspaces for a bounded Hankel operator are in correspondence with weighted model spaces, and they are closely related to nearly S^* -invariant subspaces. In this direction, we prove that these subspaces in vector valued Hardy spaces are nearly S^* -invariant with finite defect in general. Furthermore, we also describe the structure of such subspaces using our characterization of nearly invariant subspaces of finite defect in vector valued Hardy space providing a short proof compared to scalar valued case. At the end, we calculate the precise action of the associated Hankel operator on some particular *Schmidt* subspaces.