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The sub-optimal Hankel norm approximation problem for the Wiener class

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1 Abstract

The sub-optimal Hankel norm approximation problems have been studied extensively in the literature and we have nothing to add in this direction. The new contribution of this paper is to present an elementary derivation of the reduction of the sub-optimal Hankel norm approximation problem to a J -spectral factorization problem. We do this for the Wiener class of matrix-valued functions. The solution of this J -spectral factorization problem can then be obtained solving two equations involving projection operators, hence obtaining an explicit parameterization of all solutions to the sub-optimal Hankel norm approximation problem.

The first source of the connection between the sub-optimal Hankel norm approximation problem and a J -spectral factorization problem is Ball and Helton [1], although it is not stated explicitly there. Various corollaries of this abstract paper have been stated, but there is a gap between the abstract theory in [1] and the elementary looking corollaries. This motivated the search for an elementary self-contained proof in many papers. These elementary proofs were important steps along the way to solving the sub-optimal Nehari problem or the sub-optimal Hankel norm approximation problem for specific classes of

infinite-dimensional systems. Consequently, there were several slightly different versions presented.

The results presented in this paper refines and/or generalizes the preceding lemmas in Sasane and Curtain [4] and Iftime and Zwart [2]. We use in an essential way the notion of equalizing vectors, introduced by G. Meinsma [3].

References

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