From a canonical factorization to a J-spectral factorization for a class of infinite-dimensional systems

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Matrix-valued functions in the Wiener class on the imaginary line are considered in this note. This class of functions is large enough to be suitable for many applications in systems and control of infinite-dimensional systems. For this class of functions three kinds of factorization are discussed: (right-)standard factorization (also called noncanonical factorization), canonical factorization, and J-spectral factorization. In particular, we focus on an algorithmic procedure to find a (right-)standard factorization and a J-spectral factorization for matrix-valued functions in the Wiener class under the assumption that such factorizations exists. In practice, the J-spectral factors for irrational functions are usually calculated using rational approximations. We show that approximation using rational functions may be achieved in the Wiener norm.