It might be allowed to mention that there is quite a number of misprints, but most of them are quite harmless like misspelling of names. It is more regrettable that the first definition of Hausdorff distance is blurred by a missing comma. That observation does not influence my opinion that this is a very good book for anyone interested in constructive function theory and that it certainly can be used as an educative graduate text-book.

REFERENCES


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This book concerns the spectral theory of operator polynomials, i.e., of expressions of the form

\[ A(\lambda) = A_0 + \lambda A_1 + \cdots + \lambda^n A_n, \]

where \( \lambda \in \mathbb{C} \) is a spectral parameter and \( A_0, \ldots, A_n \) are operators acting in a Hilbert space \( H \). This subject also includes the spectral theory of a single operator, which appears if one takes \( n = 1 \). The motivation for a polynomial spectral theory arises in the study of differential equations

\[
\begin{align*}
A_n \varphi^{(n)}(t) + \cdots + A_1 \varphi^{(1)}(t) + A_0 \varphi(t) &= 0, \\
\varphi^{(j)}(0) &= x_j, \quad j = 0, \ldots, n-1.
\end{align*}
\]

Here the unknown function \( \varphi \) is a \( H \)-valued function on \( 0 \leq t < \infty \) and the initial data \( x_0, \ldots, x_{n-1} \) are vectors in \( H \). A solution \( \varphi \) of (2) is called elementary whenever \( \varphi \) is of the form

\[
\varphi(t) = e^{\lambda_0 t} \left( \sum_{\nu=0}^{k-1} \frac{1}{\nu!} t^\nu x_{k-1-\nu} \right).
\]

If \( H = \mathbb{C}^m \) and the leading coefficient \( A_n \) is invertible, then any solution of (2) is a linear combination of elementary solutions. As is well known, the latter statement follows from the general fact that for \( A_n = I \) (the identity operator on \( H \)) the function (3) is a solution of (2) if and only if

\[
(A - \lambda_0) \hat{x}_0 = 0, \quad (A - \lambda_0) \hat{x}_j = \hat{x}_{j-1}, \quad j = 1, \ldots, k - 1,
\]