Preface

This monograph contains an exposition of the properties and applications of multiplier convergent series with values in a topological vector space. If λ is a space of scalar valued sequences and $\sum_j x_j$ is a (formal) series with values in a topological vector space X, the series $\sum_j x_j$ is λ multiplier convergent if the series $\sum_{j=1}^{\infty} t_j x_j$ converge in X for every $\{t_j\} \in \lambda$. For example, if $M_0 = \{\chi_\sigma : \sigma \subset \mathbb{N}\}$, where χ_σ is the characteristic function of σ, then M_0 multiplier convergence is just subseries convergence. Basic properties of multiplier convergent series are developed in Chapter 2 and applications of multiplier convergent series to topics in topological vector spaces and vector valued measures are given in Chapter 3. A classical result of Orlicz and Pettis states that if a series in a normed linear space is subseries convergent (M_0 multiplier convergent) in the weak topology of the space, then the series is actually subseries convergent (M_0 multiplier convergent) in the norm topology of the space. Generalizations of this theorem to λ multiplier convergent series with values in a locally convex space are given in Chapters 4, 5 and 6. Another classical theorem of Hahn and Schur asserts that if $\sum_j t_{ij}$ is absolutely convergent for every $i \in \mathbb{N}$ and if $\lim_i \sum_{j\in\sigma} t_{ij}$ exists for every $\sigma \subset \mathbb{N}$ with $t_j = \lim_i t_{ij}$, then the series $\sum_j t_j$ is absolutely convergent and

$$\lim_i \sum_{j=1}^{\infty} |t_{ij} - t_j| = 0.$$

In Chapter 7 we establish generalizations of the Hahn-Schur Theorem to λ multiplier convergent series with values in a topological vector space. Chapters 8, 9 and 10 contain applications of the Hahn-Schur Theorems to spaces of multiplier convergent series, double series and automatic continuity of matrix mappings between sequence spaces.

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Chapter 11 extends the notion of multiplier convergent series to series with operator values and multiplier sequences with values in the domains of the operators. Chapters 12 and 13 extend the Orlicz-Pettis Theorem and Hahn-Schur Theorem to operator valued series and vector valued multipliers. Chapter 13 also contains applications to measures with values in a space of continuous linear operators. Chapter 14 considers automatic continuity results for operator valued matrices acting on vector valued sequence spaces.

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