TABLE OF CONTENTS OF VOLUME II

| Preface to Volume II | v |
|---|---|
| Table of contents of Volume II | vii |
| Introduction | 469 |
| PART V: TRIANGULAR REPRESENTATIONS | 471 |
| XX. Additive lower-upper triangular decompositions of operators 1. Additive lower-upper triangular decompositions relative to finite chains 2. Preliminaries about chains 3. Diagonals 4. Chains on Hilbert space 5. Triangular algebras 6. Riemann-Stieltjes integration along chains 7. Additive lower-upper decomposition theorem 8. Additive lower-upper decomposition of a Hilbert-Schmidt operator 9. Multiplicative integration along chains 10. Basic properties of reproducing kernel Hilbert spaces and chains 11. Example of an additive LU-decomposition in a RKHS | 472 472 473 474 476 483 485 488 491 493 496 |
| XXI. Operators in triangular form 1. Triangular representation 2. Intermezzo about completely nonselfadjoint operators 3. Volterra operators with a one-dimensional imaginary part 4. Unicellular operators | 502 502 505 507 511 |
| XXII. Multiplicative lower-upper triangular decompositions of operators 1. LU-factorization with respect to a finite chain 2. The LU-factorization theorem 3. LU-factorizations of compact perturbations of the identity 4. LU-factorizations of Hilbert-Schmidt perturbations of the identity 5. LU-factorizations of integral operators 6. Triangular representations of operators close to unitary 7. LU-factorization of semi-separable integral operators 8. Generalized Wiener-Hopf equations 9. Generalized LU-factorization relative to discrete chains | 513 514 517 522 527 530 536 538 544 |
| Comments on Part V | 555 |
| Exercises to Part V | 556 |
| PART VI: CLASSES OF TOEPLITZ OPERATORS | 561 |
| XXIII. Block Toeplitz operators | 562 |

| 1. Preliminaries | 562 |
|--|-----|
| 2. Block Laurent operators | 564 |
| 3. Block Toeplitz operators | 570 |
| 4. Block Toeplitz operators defined by continuous functions | 573 |
| 5. The Fredholm index of a block Toeplitz operator defined by | |
| a continuous function | 577 |
| XXIV. Toeplitz operators defined by rational matrix functions | 583 |
| 1. Preliminaries | 583 |
| 2. Invertibility and Fredholm index (scalar case) | 585 |
| 3. Wiener-Hopf factorization | 587 |
| 4. Invertibility and Fredholm index (matrix case) | 588 |
| 5. Intermezzo about realization | 590 |
| 6. Inversion of a block Laurent operator | 595 |
| 7. Explicit canonical factorization | 597 |
| 8. Explicit inversion formulas | 602 |
| 9. Explicit formulas for Fredholm characteristics | 606 |
| 10. An example | 612 |
| 11. Asymptotic formulas for determinants of block Toeplitz matrices | 616 |
| XXV. Toeplitz operators defined by piecewise continuous matrix functions | 623 |
| 1. Piecewise continuous functions | 623 |
| 2. Symbol and Fredholm index (scalar case) | 630 |
| 3. Symbol and Fredholm index (matrix case) | 634 |
| 4. Sums of products of Toeplitz operators defined by piecewise continuou | s |
| functions | 640 |
| 5. Sums of products of block Toeplitz operators defined by piecewise | |
| continuous functions | 643 |
| Comments on Part VI | 645 |
| Exercises to Part VI | 647 |
| · | 01. |
| PART VII: CONTRACTIVE OPERATORS AND CHARACTERISTIC | |
| OPERATOR FUNCTIONS | 653 |
| XXVI. Block shift operators | 654 |
| 1. Forward shifts and isometries | 654 |
| 2. Parts of block shift operators | 658 |
| 3. Invariant subspaces of forward shift operators | 660 |
| XXVII. Dilation theory | 665 |
| 1. Preliminaries about contractions | 665 |
| 2. Preliminaries about dilations | 667 |
| 3. Isometric dilations | 670 |
| 4. Unitary dilations | 676 |
| 5. Intermezzo about 2×2 operator matrix completions | 680 |
| 6. The commutant lifting theorem | 685 |
| 7. Applications to interpolation problems | 690 |

| 8. Dilation of contraction semigroups | 69 |
|---|-----|
| XXVIII. Unitary systems and characteristic operator functions | 700 |
| 1. Completely non-unitary operators | 70 |
| 2. Unitary systems and their transfer functions | 704 |
| 3. Unitary equivalence | 71: |
| 4. Characteristic operator functions and embedding theorems | 710 |
| 5. Realization theorem and functional model | 723 |
| 6. Cascade connections | 737 |
| 7. Factorization and invariant subspaces | 741 |
| 8. Regular factorization of analytic matrix functions | 750 |
| 9. Intermezzo about triangular representations of contractions | 752 |
| 10. Multiplicative representations of transfer functions | 758 |
| 11. Unicellularity | 771 |
| 12. Dissipative operators and their characteristic operator functions | 775 |
| | |
| Comments on Part VII | 782 |
| Exercises to Part VII | 784 |
| PART VIII: BANACH ALGEBRAS AND ALGEBRAS OF OPERATORS | 787 |
| XXIX. General theory | 788 |
| 1. Definition and examples | 788 |
| 2. Wiener algebras | 789 |
| 3. Ideals and quotient algebras | 792 |
| 4. Invertibility | 794 |
| 5. Spectrum and resolvent | 797 |
| 6. Spectra relative to subalgebras | 798 |
| 7. Spectral radius | 800 |
| 8. Matrices over Banach algebras | 804 |
| 9. Factorization in Banach algebras | 806 |
| | |
| XXX. Commutative Banach algebras | 811 |
| 1. Multiplicative linear functionals | 811 |
| 2. Maximal ideals | 817 |
| 3. The Gelfand transform | 820 |
| 4. Examples of Gelfand spectra and transforms | 822 |
| 5. Finitely generated Banach algebras | 825 |
| 6. The algebra generated by a compact operator | 82 |
| 7. The radical | 828 |
| 8. Matrices over commutative Banach algebras | 829 |
| 9. Factorization of matrix functions | 83 |
| 10. Wiener-Hopf integral operators revisited | 838 |
| XXXI. Elements of C^* -algebra theory | 843 |
| 1. Preliminaries about C^* -algebras | 843 |
| 2. The Stone-Weierstrass theorem | 848 |
| 3. The Gelfand-Naimark representation theorem | 840 |

| 4. Functional calculus for normal elements 5. Nonnegative elements and positive linear functionals 6. Characterization of C*-algebras 7. The spectral theory for normal operators | 848 849 853 857 |
|---|---------------------------------|
| XXXII. Banach algebras generated by Toeplitz operators 1. Algebras of Toeplitz operators defined by continuous functions (scalar case) 2. Algebras of Toeplitz operators defined by continuous functions (matrix case 3. Algebras of Toeplitz operators defined by piecewise continuous matrix | |
| functions (finitely many discontinuities) 4. Algebras of Toeplitz operators defined by piecewise continuous matrix functions (general case) | 874 879 |
| 5. The Fredholm index | 883 |
| Comments on Part VIII | 885 |
| Exercises to Part VIII | 886 |
| PART IX: EXTENSION AND COMPLETION PROBLEMS | 891 |
| XXXIII. Completions of matrices | 892 |
| 1. One step extensions | 892 897 |
| 2. Positive completions 3. Strictly contractive completions | 901 |
| XXXIV. A general scheme for completion and extension problems 1. Band extensions 2. Positive extensions 3. Strictly contractive extensions | 905 905 912 917 931 |
| 4. Maximum entropy principles | |
| XXXV. Applications of the band method 1. Positive completions of operator matrices | 939 939 |
| 2. Strictly contractive completions of operator matrices | 945 |
| 3. The Carathéodory-Toeplitz extension problem | 949 |
| 4. The Nehari extension problem | 956 |
| 5. The Nevanlinna-Pick interpolation problem revisited 6. Tangential Nevanlinna-Pick interpolation | 961 965 |
| 7. Rational contractive interpolants | 969 |
| Comments on Part IX | 978 |
| Exercises to Part IX | 980 |
| Standard references texts | 983 |
| Bibliography | 984 |
| List of symbols | 1003 |
| Subject index | 1007 |
| Table of contents of Volume I | 1017 |