

Lars Hörmander

The Analysis of Linear Partial Differential Operators IV

Fourier Integral Operators



Springer-Verlag

Berlin Heidelberg NewYork Tokyo

Contents

Introduction	1
Chapter XXV. Lagrangian Distributions and Fourier Integral Operators	3
Summary	3
25.1. Lagrangian Distributions	4
25.2. The Calculus of Fourier Integral Operators	17
25.3. Special Cases of the Calculus, and L^2 Continuity	24
25.4. Distributions Associated with Positive Lagrangian Ideals	35
25.5. Fourier Integral Operators with Complex Phase	43
Notes	52
Chapter XXVI. Pseudo-Differential Operators of Principal Type	54
Summary	54
26.1. Operators with Real Principal Symbols	57
26.2. The Complex Involutive Case	73
26.3. The Symplectic Case	81
26.4. Solvability and Condition (Ψ)	91
26.5. Geometrical Aspects of Condition (P)	110
26.6. The Singularities in N_{11}	117
26.7. Degenerate Cauchy-Riemann Operators	123
26.8. The Nirenberg-Treves Estimate	134
26.9. The Singularities in N_2^e and in N_{12}^e	137
26.10. The Singularities on One Dimensional Bicharacteristics	149
26.11. A Semi-Global Existence Theorem	161
Notes	163
Chapter XXVII. Subelliptic Operators	165
Summary	165
27.1. Definitions and Main Results	165
27.2. The Taylor Expansion of the Symbol	171
27.3. Subelliptic Operators Satisfying (P)	178
27.4. Local Properties of the Symbol	183

27.5. Local Subelliptic Estimates	202
27.6. Global Subelliptic Estimates	212
Notes	219
Chapter XXVIII. Uniqueness for the Cauchy problem	220
Summary	220
28.1. Calderón's Uniqueness Theorem	220
28.2. General Carleman Estimates	234
28.3. Uniqueness Under Convexity Conditions	239
28.4. Second Order Operators of Real Principal Type	242
Notes	248
Chapter XXIX. Spectral Asymptotics	249
Summary	249
29.1. The Spectral Measure and its Fourier Transform	249
29.2. The Case of a Periodic Hamilton Flow	263
29.3. The Weyl Formula for the Dirichlet Problem	271
Notes	274
Chapter XXX. Long Range Scattering Theory	276
Summary	276
30.1. Admissible Perturbations	277
30.2. The Boundary Value of the Resolvent, and the Point Spectrum	281
30.3. The Hamilton Flow	296
30.4. Modified Wave Operators	308
30.5. Distorted Fourier Transforms and Asymptotic Completeness	314
Notes	330
Bibliography	332
Index	350
Index of Notation	352