

Contents

1	Hyperfunctions	5
1.1	Function spaces	5
1.2	Supports	13
1.3	Localization	23
1.4	Hyperfunctions	28
1.5	Further applications of the Runge approximation theorem .	34
2	Basic calculus of Fourier integral operators and pseudo-differential operators	41
2.1	Preliminary lemmas	41
2.2	Symbol classes	52
2.3	Definition of Fourier integral operators	57
2.4	Product formula of Fourier integral operators I	65
2.5	Product formula of Fourier integral operators II	87
2.6	Pseudolocal properties	93
2.7	Pseudodifferential operators in \mathcal{B}	107
2.8	Parametrices of elliptic operators	112
3	Analytic wave front sets and microfunctions	115
3.1	Analytic wave front sets	115
3.2	Action of Fourier integral operators on wave front sets . .	130
3.3	The boundary values of analytic functions	155
3.4	Operations on hyperfunctions	165
3.5	Hyperfunctions supported by a half-space	183
3.6	Microfunctions	192
3.7	Formal analytic symbols	201
4	Microlocal uniqueness	205
4.1	Preliminary lemmas	205
4.2	General results	222

4.3	Microhyperbolic operators	231
4.4	Canonical transformation	239
4.5	Hypoellipticity	244
5	Local solvability	259
5.1	Preliminaries	259
5.2	Necessary conditions on local solvability and hypoellipticity	268
5.3	Sufficient conditions on local solvability	272
5.4	Some examples	285
A	Proofs of product formulae	295
A.1	Proof of Theorem 2.4.4	295
A.2	Proof of Corollary 2.4.5	323
A.3	Proof of Theorem 2.4.6	328
A.4	Proof of Corollary 2.4.7	336
A.5	Proof of Theorem 2.5.3	338
B	A priori estimates	351
B.1	Grušin operators	351
B.2	A class of operators with double characteristics	355