

## Preface

More than twenty years ago I gave a course on Fourier Integral Operators at the Catholic University of Nijmegen (1970-71) from which a set of lecture notes were written up; the Courant Institute of Mathematical Sciences in New York distributed these notes for many years, but they became increasingly difficult to obtain. The current text is essentially a nicely TeXed version of those notes with some minor additions (e.g., figures) and corrections.

Apparently an attractive aspect of our approach to Fourier Integral Operators was its introduction to symplectic differential geometry, the basic facts of which are needed for making the step from the local definitions to the global calculus. A first example of the latter is the definition of the wave front set of a distribution in terms of testing with oscillatory functions. This is obviously coordinate-invariant and automatically realizes the wave front set as a subset of the cotangent bundle, the symplectic manifold in which the global calculus takes place.

Similarly, the principal symbol of a Fourier integral distribution is defined as the leading term in the asymptotic expansion of testing with oscillatory functions. In this way the principal symbol is identified with a certain function on a space of Lagrange planes. This leads to a definition of the Maslov line bundle which looks somewhat different from the usual one, but which fits naturally with the idea of characterizing singularities of distributions by testing with oscillatory functions. It should also be noted that the asymptotic expansion is obtained by applying the method of stationary phase, which is the central analytical tool in the theory.

The text contains two basic applications of the theory: the Cauchy problem for strictly hyperbolic equations and caustics in oscillatory integrals. We have not attempted to treat the numerous other applications which have been developed since the seventies, because that would change the book from an introduction into a research monograph. For this we refer the reader to the excellent four volume book by Hörmander, *The Analysis of Linear Partial Differential Operators* published by Springer-Verlag, of

which the Notes at the end of each chapter can be used to get quite a complete overview of the applications.

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