

**Grubb, Gerd**

**Functional calculus of pseudodifferential boundary problems. 2nd ed.** (English)

Zbl 0844.35002

*Progress in Mathematics* (Boston, Mass.). 65. Basel: Birkhäuser. viii, 522 p. (1996).

This book is the second edition of the volume appeared in 1986. Though title, publishers and number in the series *Progress in Mathematics* are the same, there are some relevant changes, let us say improvements, with respect to the first edition. In particular, one notices a big effort to make this new book accessible to a large audience; for example many proofs have been replaced by simpler arguments and comments have been added for the benefit of the reader. Of course, the progress made since 1986 in the subject is taken into account, and further references appear in the bibliography. Last but not least, this second edition takes full advantage of the AMS-TEX writing, with respect to a photoreproduction of typed text in the first edition.

We think it is worth to recall in short the contents of the volume, which is addressed to the study of the linear elliptic boundary value problems by means of pseudodifferential techniques, according to the ideas of *L. Boutet de Monvel* [*Acta Math.* 126, 11-51 (1971; [Zbl 0206.39401](#))]. Chapter 1 presents the main lines of the Boutet de Monvel's calculus. Chapters 2 and 3 give the details of a parameter-dependent version of the theory, having as relevant application the study of the resolvent  $(A - \lambda)^{-1}$  of a realization of a well-posed problem. In turn this allows a functional calculus of pseudodifferential boundary problems, by defining  $f(A)$  through Cauchy integral formula. Applications are given in Chapter 4. First, evolution problems are considered, solved by  $\exp(-tA)$ , for which an explicit expression is deduced. The computation of  $\text{Tr} \exp(-tA)$  then leads to an index formula for general elliptic boundary problems. Secondly, complex powers  $A^z$  are discussed, with applications to spectral theory. Finally, the parameter-dependent theory is applied to some singular perturbation problems.

Reviewer: [L.Rodino \(Torino\)](#)

**MSC:**

- 35-02 Research exposition (monographs, survey articles) pertaining to partial differential equations
- 35S05 Pseudodifferential operators as generalizations of partial differential operators

Cited in **103** Documents

**Keywords:**

Boutet de Monvel's calculus; resolvent; functional calculus of pseudodifferential boundary problems; evolution problems; index formula; elliptic boundary problems; spectral theory; singular perturbation problems