

COMMUTATOR THEORY  
AND  
PARTIAL DIFFERENTIAL OPERATORS  
ON  
HILBERT SPACE

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1. Introduction

Commutator theory has its origins in constructive quantum field theory. It was initially developed by Glimm and Jaffe as a method of establishing self-adjointness of quantum fields and model Hamiltonians, but it has proved useful for a variety of other problems in field theory, quantum mechanics, and Lie group theory. We will describe the basic results of the theory and illustrate them with applications to first and second order partial differential operators.

The basic ideas of commutator theory and perturbation theory are very similar. One attempts to derive information about a complex system by comparison with a simpler reference system. The nature of the comparison is different, however, in the two theories. Perturbation theory applies when the difference between the systems