

## 第20回

- 講演者： **Elmar Schrohe** 氏 (Hannover大学)
  - 題目□A Families Index Theorem for Boundary Value Problems
  - 日時：平成26年2月28日（金）16：00～17：00

In this talk I will try to explain an approach to the index theory of boundary value problems via  $K$ -theory for  $C^*$ -algebras. The basic object is the algebra of pseudodifferential boundary value problems developed by L. Boutet de Monvel in 1971. It provides a framework which encompasses both the classical differential boundary value problems as well as their inverses whenever these exist. In an extension of the concept of Lopatinski and Shapiro, it associates to each operator two symbols: a pseudodifferential principal symbol, and an operator-valued boundary symbol. Ellipticity requires the invertibility of both. If the underlying manifold is compact, elliptic elements define Fredholm operators. In a combination of analytic and topological methods, Boutet derived an index theorem. The crucial ingredient is a map which associates to an elliptic boundary value problem a compactly supported  $K$ -theory class on the cotangent bundle over the interior of the manifold. The Atiyah-Singer topological index map, applied to this class, then furnishes the index of the operator. It turned out that  $C^*$ -algebra  $K$ -theory - not yet developed in 1971 - can simplify the argument considerably. It also allows to derive an index theorem for families of Boutet de Monvel operators. In both cases, the key ingredient is a precise description of the  $K$ -theory of the kernel and of the image of the boundary symbol map. Based on joint work with S. Melo, R. Nest, and T. Schick.



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