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FIFTH WINTER SCHOOL (1977)

MEASURE THEORETIC ZERO SETS IN INFINITE DIMENSIONAL SPACES AND DIFFERENTIABILITY OF LIPSCHITZ MAPPINGS

J.P.R. Christensen

Let $(G, +, \mathcal{O})$ be an abelian Polish group. Let $A \subseteq G$ be a universally measurable set. The set A is called a H -zero set if there exists a probability measure on the group G such that any translate of the set has probability zero.

In the talk it is shown that this is a generalization of zero sets for Haar measure to not necessarily locally compact groups (in particular to infinite dimensional separable Banach spaces or Frechet spaces). It is shown that several results from classical Harmonic analysis carries over. The zero set concept turns out to be particularly well adapted to differentiability of Lipschitz mappings which under reasonable conditions are differentiable almost everywhere with respect to this zero set concept.

Several open problems were mentioned. An exposition of the results and a discussions of the problems can be found in the papers listed below.

1) Jens Peter Reus Christensen, On sets of Haar measure zero in abelian Polish groups, Israel Journal of mathematics, Vol.13, Nos.3-4, 1972.

2) Jens Peter Reus Christensen, Measure theoretic zero sets in infinite dimensional spaces and applications to differentiability of Lipschitz mappings, II^{ème}-Coll. Anal. Fonct. (1973, Bordeaux) p 29-39 .