



The Hong Kong University of Science and Technology

Department of Mathematics

Seminar on Applied Mathematics

Group actions, the Mattila integral and its applications

by

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Abstract

The Mattila integral, developed by Mattila, is the main tool in the study of the Falconer distance problem. In this talk we will interpret the Mattila integral in terms of the Haar measure on the group of rigid motions, which is the invariant group for distances. Then we develop an analog of the Mattila integral associated with arbitrary groups. As applications, we will discuss about the following problems.

- How large $A, B, C \subset \mathbb{R}^d$ need to be (in terms of their Hausdorff dimensions) to ensure $A(B + C)$ has positive Lebesgue?
- How large $E \subset \mathbb{R}^d$ needs to be to ensure the set of gaps of 2-chains, i.e.
 $\{(|x - y|, |y - z|) : x, y, z \in E\} \subset \mathbb{R}^2$
has positive Lebesgue measure?
- How large $E \subset \mathbb{R}^d$ needs to be to ensure the set of product of distances, i.e.,

$$\left\{ \prod_{j=1}^k |x^j - y^j| : x^j, y^j \in E \right\}$$

has positive Lebesgue measure?

*** *Date:* *Friday, 22 Sept 2017***

*** *Time:* *3:00p.m. – 4:00p.m.***

*** *Venue:* *Room 5506, Academic Building*
*(near Lifts 25 & 26), HKUST***

All are welcome!

*** *Revised***