

# 國立中央大學數學系

## 專題演講

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演講題目：SOME REMARKS ON SINGULAR INTEGRAL  
OPERATORS

演講時間：2025年06月23日(星期一) 10:00 a.m. ~ 10:50 a.m.

演講地點：中央大學鴻經館M107

### Abstract：

The speaker will continue his talk at the conference in honor of Professor Chin-Cheng Lin which was held on January 13, 2025. We first give a brief introduction of the theory of singular integral operators and its regularity properties on some function spaces, especially the Hardy spaces.

The theory of singular integral operators (SIO), introduced by Calderón and Zygmund as part of the theory of elliptic PDE's, has seen many extensions to different settings. Remaining within  $\mathbf{R}^n$  as the ambient space, the variations introduced involve the following aspects, possibly also combined together:

- (a). replace the standard dilations, *i.e.*, scalar multiplications, with non-isotropic ones;
- (b). distinguish between a “global” theory and a “local” one;
- (c). allow multi-parameter dilations.

The basic property that is common to all these types of singular integral operators is  $L^p$ -boundedness for  $1 < p < \infty$  and *failure* of  $L^p$ -boundedness, in general, for other values of  $p$ .

Hardy spaces  $H^p$  enter into this picture as the natural substitutes of  $L^p$  with  $0 < p \leq 1$ , allowing positive results about  $H^p \rightarrow H^p$  and  $H^p \rightarrow L^p$  boundedness of singular integrals for these values of  $p$ . The point is that each of the classes of SIO mentioned above admits its own Hardy spaces, so that, whenever a new class of SIO is introduced, it is natural to ask what are its Hardy spaces.

In this talk, the speaker will use  $\bar{\partial}$ -Neumann problem on the Siegel upper half space and Kohn Laplacian on decoupled domains in  $\mathbf{C}^{n+1}$  as examples to see how harmonic analysis, especially different type of singular integral operators arise.