

# Singular Integrals in Complex Analysis

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## Abstract

**Lecture 1:** A general introduction to problems in harmonic analysis suggested by problems in complex analysis. I will briefly explain how the Calderon–Zygmund paradigm has been used in the past, and then give some examples where new kinds of operators are needed. This will not be a very technical talk.

**Lecture 2:** The theory of product singular integrals on products of Carnot–Caratheodory spaces. This will be technical, and focused mostly on harmonic analysis.

**Lecture 3:** Flag kernels on homogeneous nilpotent Lie groups, and applications to quadratic CR manifolds. (On joint work with Ricci and Stein).

**Lecture 4:** The  $d$ -bar- $b$  complex on decoupled domains. (On new work with Stein).

**Lecture 5:** Some partial results and open problems. On some preliminary results with Malabika Pramanik on the Bergman kernel on the (so called) “cross of iron” domain, and also some open questions about the Szego kernel on some nilpotent groups.