Syllabus for Oral Qualifying Exam

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1. Complex analysis in Several Complex Variables
   1. Analytic Automorphism group of some special domain:
      • Laurent expansion in Reinhardt domain.
      • Analytic automorphism group of polydisc $\Delta^n$.
      • Analytic automorphism group of unit ball $B^n$, Cartan’s Theorem.
      • Poincaré Theorem.

   2. Cauchy integral formula and its application.
      • Cauchy integral formula in polydisc, cauchy estimates.
      • Bochner-Matinelli formula.
      • Hartogs extension Theorem.
      • Bochner extension Theorem.

   3. Subharmonicity and convexity:
      • Properties of subharmonic functions and plurisubharmonic functions.
      • Domain of holomorphy, Continuity Principle.
      • Pseudoconvexity, Levi pseudoconvexity.
      • Oka’s Theorem.

   4. $L^2$ theory for $\bar{\partial}$ on pseudoconvex domains:
      • Morrey-Kohn-Hormander Theorem.
      • $L^2$ Existence Theorem for $\bar{\partial}$ operator.
• $\bar{\partial}$-Neumann problem.
• The Levi problem.

II. Some Riemannian and Complex Geometry

1. Riemann metric and connections.
2. Curvature.
3. Jacobi field
4. Hopf-Rinow Theorem and Hamamard Theorem
5. Kodaira-Bochner formula
6. Kodaira vanishing theorem.
7. Kodaira embedding theorem.
8. Hodge manifold and embedding.

References

[LH] Lars Hörmander, An Introduction to Complex Analysis in Several Complex Variables.
