

FULLY NONLINEAR EQUATIONS IN CONFORMAL GEOMETRY

Geometric flows and geometric operators

Pisa, Spring 2009

1. LECTURE 1: BACKGROUND MATERIAL IN CONFORMAL GEOMETRY

- The Uniformization Theorem and classification of compact surfaces
- The conformal group
- The curvature tensor under conformal changes of metric
- Higher dimensions: the Yamabe problem

2. LECTURE 2: THE σ_k -YAMABE PROBLEM

- The statement of the problem
- Ellipticity; some algebraic properties of the symmetric functions
- One problem, two equations: the negative cone
- Variational aspects

3. LECTURES 3, 4: A PRIORI ESTIMATES

- Local C^2 -estimates of S. Chen
- Integral estimates: connection to estimates for the p -Laplace equation
- Counterexamples to regularity for the negative cone equation

4. LECTURE 5: EXISTENCE

- The case of $k > n/2$: blow-up analysis; classification of solutions with isolated singularities
- Uniqueness of the Green's function of the sphere
- A remark about evolutionary methods: the LCF case

5. LECTURE 6: GEOMETRIC APPLICATIONS

- Pinching and sphere theorems
- Obstructions and loss of estimates