

The Monge-Ampère equation is one of the most important equations in complex differential geometry. Solving this equation one can find metrics of prescribed Ricci curvature on a compact Kähler manifold, in particular Kähler-Einstein or Calabi-Yau metrics which occur in theoretical physics.

The solutions discussed in this project have certain singularities, where they are no longer smooth. They do appear in geometry as limits of regular objects. We consider also more general differential equations and systems of equations which have geometrical motivation.

We study:

1. Regularity of solutions of Monge-Ampère type equations under various assumptions on the right hand side of the equation.
2. Their geometric applications.
3. More general system of equations (proposed by Donaldson) in symplectic geometry.
4. Harvey-Lawson theory of weak solutions of elliptic equations.