

# The Monge Ampère Equation and Geometric Optics<sup>1</sup>

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ABSTRACT. Geometric Optics studies the propagation of light having relatively small wavelengths. The trajectories of the light waves are determined by the Snell law that can be deduced from Maxwell's equations. This area is used in the design of optical systems such as telescopes and antennas. These systems have reflective(mirrors) and refractive(lenses) components that can be viewed as geometrical surfaces satisfying some PDEs. An equation that appears frequently is the Monge-Ampère equation that is a non linear second order PDE of the form  $\det D^2u = f$ .

In this talk, we give several examples of problems from optical engineering that were only analyzed numerically, and we present a theoretical approach to solve them.

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<sup>1</sup>Results presented in this talk are joint work with Cristian E. Gutiérrez at Temple University.