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Cristian E. Gutierrez (gutierre@temple.edu) and **Ahmad Sabra***
(ahmad.sabra@temple.edu). *Nonconvex solutions of the near field reflector problem.*

In recent decades, new techniques in nonlinear pde were introduced to solve problems in Geometric Optics. This work considers the near field reflector problem, that is, to find a surface that reflects rays emitted from a point source O into a target set D and satisfying some energy and luminance conditions at the target, taking into account the inverse square law of irradiance. The surface solving this problem is a weak solution of a Monge Ampère type differential equation. Similar problems have been already addressed mathematically and only convex or concave solutions were constructed. Using a covering theorem, we prove the existence of non convex nor concave solutions of the near field reflector problem, which provides a new class of solutions to the corresponding pde. (Received January 17, 2015)