1056-35-1828 **Emek Kose Can*** (eksecan@lmu.edu), Loyola Marymount University, Department of Mathematics, 1 LMU Drive University Hall Suite 2700, Los Angeles, CA 90045, and **Ronald Perline**, Drexel University Mathematics Department, 206 Korman Hall, 3141 Chestnut St., Philadelphia, PA 19104. *Micromirror Method For Catadioptric Sensor Design.*

We present a novel method for design of imaging systems called catadioptric sensors, which consist of a micromirror array, a conventional asymmetric mirror and an orthographic camera. The main problem of catadioptric sensor design is constructing a mirror for a given projection which generically does not have a solution. We overcome limitations of single-mirror catadioptric sensors by designing the camera projection as well as the mirror surface. This construction allows us to exactly achieve any desired projection, not only orthographic or perspective. The key in finding the mirror surface and the camera projection is, constructing a vector field normal to the sought-after surface. For the surface to exist, the normal vector field has to be integrable. The integrability condition for the vector field is provided by Frobenius integration theorem for differential forms. The integrability condition yields a system of first order quasilinear partial differential equaitons, whose numerical solution is the camera projection. Computing the mirror surface is done by numerically integrating the normal vector field. We present our results for four different systems where error for both projection and mirror surface are very promising. (Received September 22, 2009)