

Some Unconventional Geometric Optics

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Geometric optics prizes smooth regular surfaces that provide stable transforms of ray bundles. In the neglected area of irregular semi-smooth surfaces, we find opportunities to design static surfaces that display dynamic imagery. Examples include metal plates that reflect holographic animations; wooden shade screens that cast grayscale "video shadows"; and lenses and mirrors that rearrange sunshine into morphing photographs. Often the mapping from light source to target imagery is provably infeasible, however the foibles of the human visual system provide openings for compelling illusions via optimization. Using geometric optics to make art about geometry turns out to be popular with the general public, partly because everyone likes illusions, and partly because the materials and physics involved are familiar even to a child.