Minimal BRDF Sampling for Two-Shot Near-Field Reflectance Acquisition

We develop a method to acquire the BRDF of a homogeneous flat sample from only two images, taken by a near-field perspective camera, and lit by a directional light source. Our method uses the MERL BRDF database to determine the optimal set of lightview pairs for data-driven reflectance acquisition. We develop a mathematical framework to estimate error from a given set of measurements, including the use of multiple measurements in an image simultaneously, as needed for acquisition from near-field setups. The novel error metric is essential in the near-field case, where we show that using the condition-number alone performs poorly. We demonstrate practical near-field acquisition of BRDFs from only one or two input images. Our framework generalizes to configurations like a fixed camera setup, where we also develop a simple extension to spatially-varying BRDFs by clustering the materials.

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