TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

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Metalenses and Refraction Problems

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Abstract: Metalenses are ultra thin surfaces that are composed of nano structures to focus light. These nano structures manipulate light waves by abrupt phase shifts over the scale of the wavelength to bend them in unusual ways. Compared to the bulky, thick shapes of the conventional lenses, metalenses offer many advantages in optical applications due to their reduced thicknesses and multifunctionalities. Mathematically a metalens can be represented by a pair (Γ, Φ) where Γ is a surface in $\mathbb{R}^3$, and Φ is a C^1 function defined in a neighborhood of Γ, called phase discontinuity. The knowledge of Φ yields the type of arrangements of the nano structures on the surface that are needed for a specific refraction job. In this talk we are going to discuss several refraction problems starting from the existence of phase discontinuity functions that refract a ray in desired directions and conserve energy.