TEMPLE UNIVERSITY

Department of Mathematics

Analysis Seminar

Room 617 Wachman Hall

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On the existence of dichromatic single element lenses

by Cristian Gutierrez

Temple University

Abstract: Due to dispersion, light with different wavelengths, or colors, is refracted at different angles.

So when white light is refracted by a single lens, in general, each color comes to a focus at a different distance from the objective. This is called chromatic aberration and plays a vital role in lens design.

A way to correct chromatic aberration is to build lenses that are an arrangement of various single lenses made of different materials.

Our purpose in this talk is to show when is mathematically possible to design a lens made of a single homogeneous material so that it refracts light superposition of two colors into a desired fixed final direction. Two problems are considered: one is when light emanates in a parallel beam and the other is when light emanates from a point source.

The mathematical tools used to solve these problems include fixed point theorems and functional differential equations. This is joint work with A. Sabra.