THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Online Undergraduate Analysis and PDE Seminar

September 23, 2022
1:30 - 2:30 p.m.
Zoom

Exploring notions of curvature for families of curves

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Abstract. A major thread of research within harmonic analysis is to try to understand the different ways in which curved objects might appear bigger than their topological dimensions suggest, and how much bigger. One manifestation of this phenomenon is that the function

$$Af(x) = \int f(\gamma_x(t))\, dt,$$

defined by integrating a function f over a family $\{\gamma_x\}$ of one-dimensional curves, is "nicer" in various ways than the original function f when the family $\{\gamma_x\}$ is appropriately "curved."

In the first part of this talk, Prof. Stovall will make the notions of "curved" and "nicer" more precise, and describe some of the history and fundamental results in this area.

In the second part of the talk, undergraduate students Alwan, Huang, Huang, and Westbrook will present new results and examples that help characterize just how curved a family of curves can be in moderate dimensions (up to 14). The results described in the second part of the talk were developed as part of an RTG REU project of Alwan, Huang, Huang, and Westbrook from Summer 2022, with mentorship from Amelia Stokolosa and Prof. Stovall.

The prerequisites for understanding this talk will be kept to a minimum, but prior exposure to multivariable calculus and perhaps an analysis or advanced calculus course would be helpful in understanding some of the concepts.