Dean's Colloquium

Dr. Dejenie Alemayehu Lakew, Assistant Professor

Department of Mathematics, Hampton University

When: Wednesday, March 20, 2024
Where: Turner 129
Time: 3:30-3:50 pm, Q&A: 5 min

Title: On Orthogonal Parts of a Solution to a Cauchy BVP over Sobolev Spaces

Abstract: In this presentation, we consider boundary value problems, differential equations with boundary conditions of first, second and higher order on a special space of functions called Sobolev spaces over a bounded and smooth domain Ω in the n-dimensional Euclidean space.

The problem is to find a solution in a specific function space which solves the differential equation over the domain Ω and meets boundary conditions, conditions that the solution should satisfy along the boundary $\partial\Omega$. Here ∂ denotes boundary and hence $\partial\Omega$ denotes the boundary of the domain Ω.

Our study finds that the solution u of such a differential equation is in fact an orthogonal or perpendicular sum of the part of the solution that evolves from f, the value of the derivative of the solution u of the given order over Ω and the part of the solution that evolves from g, the trace of the solution u over the closure of Ω.

The symbols: $\uplus$ and $\oplus$ represent respectively, orthogonal, or perpendicular sums of functions and function subspaces of a Sobolev space with inner product.

Biography: Dr. Dejenie Alemayehu Lakew is a faculty member in the mathematics department, school of science since August 2019. He is a long-standing member of the American Mathematical Society who presented research papers and participated at the American Mathematical Society, annual joint meetings since 1998 and as recently as 2018. His imagery works are available in the American Mathematical Society's Mathematical Imagery Page, titled: Hyper Symmetries.

He made presentations at the mathematics department regular faculty seminar, Hampton University and at colloquium series in VCU and in Stratford University. His research focuses on functional analysis of various settings: real, complex, and hyper complex/ Clifford analysis and ordinary and partial differential equations.