Contributed Papers
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KHALED ALDWOAH, Islamic University of Madinah

Generalized Groups

This paper generalizes the concept of a group as follows. A triple $(G, E, \star)$ is a generalized group if G is a nonempty set, E is an equivalence relation on G, and $\star$ is a function on $G \times G$ satisfying some conditions. New concepts as will as new examples of generalized groups are introduced.

ANUP DIXIT, University of Toronto

The Lindelof class of L-functions

In 1989, Selberg defined a class of L-functions that serves as an axiomatic model for L-functions arising from geometry and arithmetic. Even though the Selberg class successfully captures many characteristics common to most L-functions, it fails to be closed under addition. This creates obstructions, in particular, not allowing us to interpolate between L-functions. To overcome this limitation, V. Kumar Murty defined a general class of L-functions, namely the Lindelof class. In this talk, we describe its structure and study its properties. This is joint work with V. Kumar Murty.

ALEXANDRE PEPIN, Université de Moncton

A new method for the construction of spline functions of any degree

Spline interpolation is widely used in industry and research. It has proved to be a very efficient tool, particularly when dealing with data interpolation or curve smoothing applications. It is typically preferred to polynomial interpolation as it avoids the problem of Runge's phenomenon where oscillations occur at the edges of the interval when using higher degree polynomials. Cubic spline interpolation is known to be a popular type of spline used in practice due to its accuracy and low computational cost. However, effective and accurate higher degree spline interpolation is still a challenging task in today's applications and is not so commonly used because it requires the knowledge of higher order derivatives at the nodes of a function on a given mesh.

In this presentation, we will suggest a new method that was initially developed by Beaudoin (1998, 2003) and Beauchemin (2003). They observed that this method can lead to high-degree spline interpolation for equally spaced data on an interval $[0, T]$. Initially, they did not have any formal proof to back up this statement. In recent work (Pepin, Léger, Beaudoin, Beauchemin, 2018), the continuity of these interpolation functions has been demonstrated. Therefore, our goal is to analyze the singularities that may occur when solving the equation system that enables the construction of splines of any degree. We will suggest a robust method that will allow us to accurately determinate the boundary conditions of our spline functions. We will also analyze some numerical examples to show the efficiency of this new algorithm.