

Titolo: *Graphs with a Uniform Local Structure and Their Applications*

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Abstract:

This poster presents the intricate structures and properties of d -level diamond Toeplitz graphs and their applications in computational mathematics. It offers insights into the construction of these graphs, their weight functions, and the properties that make them ideal for numerical applications. The theoretical section demonstrates that the sequence of adjacency matrices possesses a canonical eigenvalue distribution, which can be associated with a symbol.

Understanding the fundamental analytical characteristics of this symbol is crucial, as it provides essential information about the eigenvalue structure, including aspects such as localization, spectral gaps, clustering, and overall distribution. As a central example, we examine the classic Laplacian within a triangular domain, showcasing the adaptability and potential of this method in simplifying complex computational challenges, particularly in solving partial differential equations. The poster also outlines a strategy for efficiently solving the linear systems that arise from the discretization of such problems on non-rectangular domains, offering a novel multigrid approach.