



Faculty of
Science and
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Constructions of graphs with self-similar structures and their structural properties with applications

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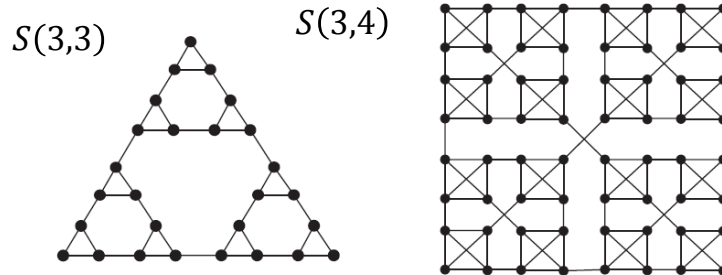


Fig.1 : Sierpiński graphs.

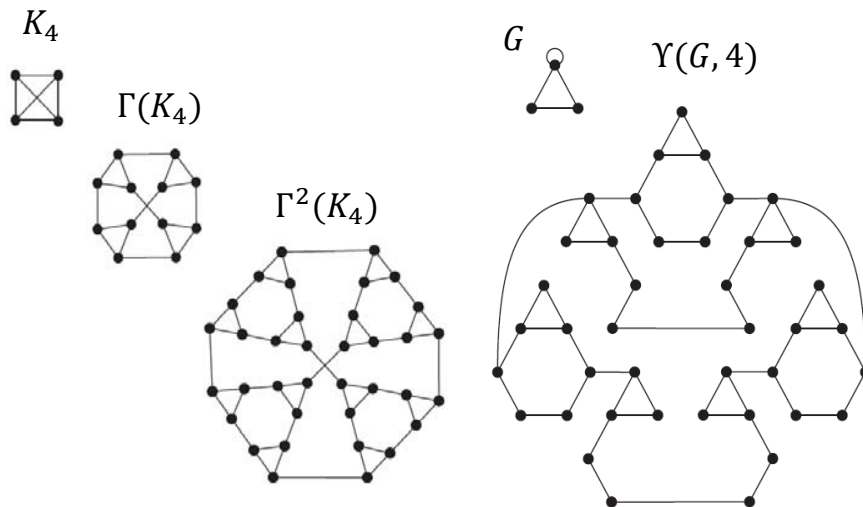


Fig. 2: Applications of the subdivided-line graph operation to the complete graph K_4 .

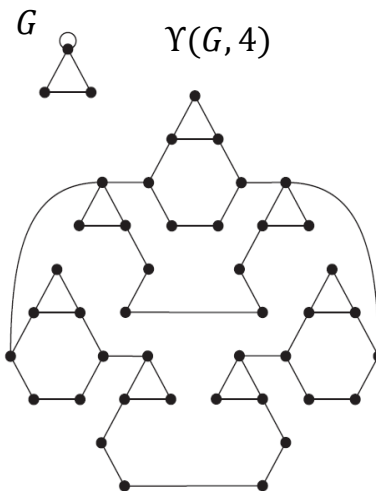


Fig. 3: Universalized Sierpiński graphs.

Content:

Sierpinski graphs $S(n, k), n \geq 1, k \geq 2$ are known to be graphs with self-similar structures and their various properties have been studied until now. It is also known that Sierpinski graphs are isomorphic to WK-recursive networks which have been proposed as interconnection networks for massively parallel computers because of their remarkable extendability. The purpose of this study is mainly to investigate their structural properties with applications to interconnection networks.

In this study, we newly introduced the subdivided-line graph operation Γ and showed that $S(n, k)$ is obtained from $S(n - 1, k)$ by applying Γ . Although $S(n, k)$ can be obtained by combining k copies of $S(n - 1, k)$ based on the definition, the constructions by Γ help us to investigate structural properties of $S(n, k)$ directly from those of $S(n - 1, k)$. So far, we have obtained results on structural properties of subdivided-line graphs concerning interconnection networks such as diameter, connectivity, edge-disjoint Hamiltonian cycles, several variants of dominating sets, completely independent spanning trees, and book-embeddings. Besides, we newly defined the class of universalized Sierpinski graphs apart from the class of subdivided-line graphs, and have been investigating their structural properties.

Keywords : subdivided-line graphs, universalized Sierpinski graphs

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