XIX SUMMER SCHOOL IN DISCRETE MATHEMATICS
January 8-12, 2023.

Valparaíso, Chile.

The twin-width of powers of graphs with bounded tree-width

Mauricio Yépez, Henry Echeverría, Andrea Jiménez and Daniel A. Quiroz *

Instituto de Ingeniería Matemática-CIMFAV
Universidad de Valparaíso

Abstract

Twin-width is a new graph parameter introduced by Bonnet, Kim, Thomassé and Watrigant [1]. Graphs classes with bounded twin-width include those with bounded tree-width, clique-width, and also planar graphs and proper minor-closed classes. Moreover, they preserve most of the nice algorithmic properties of clique-width.

In this work, we study the twin-width of power of graphs with bounded tree-width. This is known to be bounded but existing bounds are implicit and very large [1]. We provide a bound of k for the twin-width of the k-th power of any tree and show that this bound is tight. We also show that if G has tree-width at most t, then the twin-width of the k-th power of G is at most $(1 + 2^k) \cdot 2^{k\cdot(t-1)}$.

References

[1] ÉDOUARD BONNET, EUN JUNG KIM, STÉPHAN THOMASSÉ, AND RÉMI WATRIGANT, *Twin-width I: tractable FO model checking*, Journal of the ACM **69**(1):1–46, 2021.

*This work is supported by the following grants and projects: 1. MATH-AMSUD MATH210008 2. ANID BECAS/DOCTORADO NACIONAL 21231444 (Mauricio Yépez) 3. ANID BECAS/DOCTORADO NACIONAL 21231147 (Henry Echeverría) 4. ANID/Fondecyt Regular 1220071 (Andrea Jiménez) 5. ANID/FONDECYT Iniciación en Investigación Grant 11201251 (Daniel Quiroz)
Emails: {mauricio.yepez, henry.echeverria}@postgrado.uv.cl, {andrea.jimenez, daniel.quiroz}@uv.cl