Matemática Contemporânea
Vol. 55, 1–10
http://doi.org/10.21711/231766362023/rmc551

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# Preface

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This volume contains some of the works presented at the 10th Latin-American Workshop on Cliques in Graphs (LAWCG 2022), which took place in Curitiba, Brazil, from October 16th to 19th, 2022. The Latin American Workshop on Cliques in Graphs has developed into a traditional event in the field of Graph Theory, attracting participants from an increasing number of countries each year.

Previous editions were hosted in the following countries: Brazil (2002), Argentina (2006), Mexico (2008), Brazil (2010), Argentina (2012), Brazil (2014), Argentina (2016), Brazil (2018), and Brazil (2020, held online). Originally, the workshop aimed to promote collaboration among Latin American researchers working on Graph Theory and Combinatorics, with a specific focus on cliques, clique graphs, the behavior of the clique operator, and related topics. Over these twenty years, the community has flourished, and the workshop has transformed into a platform not only for exchanging ideas about cliques and graphs but also for strengthening the bonds among its community members and fostering new relationships.

LAWCG 2022 was enthusiastically celebrated for returning to an in-person format after LAWCG 2020, which had to be held remotely due to COVID-19 distancing guidelines.

We are grateful to the Steering and Program Committees, and especially to the Organizing Committee, for their hard work in overcoming the challenges and successfully hosting the meeting. We also thank the anonymous referees for their prompt and thorough work.

The scientific community strongly supported LAWCG 2022 with 69 abstract presentations by 164 authors from five countries: Argentina, Brazil, France, Mexico, and the United Kingdom. We are grateful to all the participants and especially to the invited speakers Vinícius dos Santos (UFMG, Brazil), Ana Shirley Silva (UFC, Brazil), and Mucuy-kak Guevara (UNAM, México) for their motivating plenary talks. More details on the event can be checked on the website https://www.lawcg.mat.br/lawcg22/.

Regarding this special issue of Matemática Contemporânea, we would like to express our gratitude to the authors of the 16 extended abstracts and the referees for their valuable contributions to the publication process. Their dedicated efforts have culminated in this highly significant collection, which we anticipate will inspire researchers in the field of graph theory.

The first LAWCG was held in Rio de Janeiro in 2002 in honor of professor Jayme Szwarcfiter on his sixtieth birthday, and LAWCG 2022 had the great pleasure of celebrating the 20th anniversary of the workshop along with Jayme's 80th birthday. The editorial board and contributing authors dedicate this issue of Matemática Contemporânea to Jayme Szwarcfiter in recognition of his twenty years of collaboration with LAWCG and the significance of his work in Graph Theory.

Finally, we would like to thank the Editor-in-Chief of *Matemática Contemporânea*, Jaqueline Godoy Mesquita, for opening this important forum for the participants of this Latin-American Workshop.

**Editorial Board**
André L. P. Guedes
Marina Groshaus
Sheila Almeida
Márcia R. Cappelle
Simone Dantas

# 1 Works presented at LAWCG 2022

# 2 Plenary Talks

- A gentle introduction to reconfiguration
  Vinicius Fernandes dos Santos, DCC - Universidade Federal de Minas Gerais, Brazil
- Connectivity Problems on Temporal Graphs
  Ana Shirley Ferreira da Silva, Universidade Federal do Ceará, Brazil
- A tour of kernels in digraphs and their generalizations
  Mucuy-kak Guevara, Facultad de Ciencias - Universidad Nacional Autonoma de Mexico, Mexico

# 3 Contributed Talks

1. On the hardness of finding arc-disjoint branching flows in $(k, \lambda, s)$-sufficient networks.
   Cláudio Carvalho, Jonas Silva, Raul Lopes, Ana Karolinna Maia, Nicolas Nisse and Cláudia Sales
2. Positive results for finding arc-disjoint branching flows on $(k, \lambda, s)$-sufficient networks
   Cláudio Carvalho, Jonas Costa, Raul Lopes, Ana Karolinna Maia, Nicolas Nisse and Cláudia Sales
3. On two-path geometries in digraphs
   Marisa Gutierrez, Mitre Dourado, Fabio Protti and Silvia Tondato
4. From word-representable graphs to altered Tverberg-type theorems
   Deborah Oliveros and Antonio Torres-Hernandez
5. Graph properties on routing problems with time intervals
   Thailsson Clementino, Rosiane de Freitas and Eduardo Uchoa
6. A New Heuristic for the Euclidean Steiner Tree Problem in $n$ Dimensions
   Nelson Maculan and Renan Pinto

7. Acyclic Coloring of Digraph Products
   Isnard Costa and Ana Silva

8. Contributions in scheduling theory and special graph colorings with Jayme
   Rosiane de Freitas

9. Multicolored Ramsey numbers for 4-cycle and stars
   Lucas da Penha Soares and Emerson Luiz Do Monte Carmelo

10. Two infinite families of Type 1 generalized Petersen graphs
    Sérgio Fusquino, Mauro Nigro and Diana Sasaki

11. Dominação Romana em Classes de Snarks
    Guilherme Willian Saraiva da Hora and Atilio Gomes Luiz

12. Domination and Independent Domination Numbers of some Families of Snarks
    A. A. Pereira and C. N. Campos

13. $k$-independence in some Cartesian products
    Márcia Cappelle, Erika Coelho, Otávio Mortosa and Julliano Nascimento

14. Weighted Connected Matchings
    Guilherme C. M. Gomes, Bruno P. Masquio, Paulo E. D. Pinto, Vinicius F. dos Santos and Jayme L. Szwarcfiter

15. Equitable total coloring of Semiblowup and Kochol snark families total coloring
    Isabel F. A. Gonçalves, Simone Dantas and Diana Sasaki

16. Edge coloring of split graphs with even maximum degree
    Cintia Izabel Cararo, Sheila Morais de Almeida, Cândida Nunes da Silva and Glasielly Demori Proença

17. The $(p, 1)$-total number of graphs with maximum degree three
    Mayara Omai, C. N. Campos and Atílio G. Luiz

18. Estudo sobre $(r + 1)$-atribuição de papéis para prismas complementares, com $r \geq 3$
    Diane Castonguay, Elisângela S. Dias, Fernanda N. Mesquita and Julliano R. Nascimento

19. $K$-comportamiento de gráficas cocordales
    Lesli Hernández-Sayago, Miguel Pizaña and Rafael Villarroel-Flores
20. Hardness of the $f$-Reversible Process in Directed Graphs
    Isac Costa, Carlos Vinicius Lima and Thiago Braga Marcilon
21. How to draw a $K(n, 2)$ Kneser graph?
    Luerbio Faria, Antonio Sousa, Jonas Carneiro and Mario Pabon
22. Fullerene Waves
    João Pedro Costa and Diego Nicodemos
23. On Total Colouring Bipartite Graphs with at Most Three Bicliques
    Gustavo Leardini Montanheiro, Leandro Zatesko and Marina Groshaus
24. Local antimagic chromatic number of Bethe trees
    Francisca Andrea Macedo França, Andre Ebling Brondani and Lara Rodrigues Ventura
25. On non-equitable color class configurations for small Type 1 cubic graphs
    Matheus Adauto, Celina Figueiredo and Diana Sasaki
26. Locally irregular decompositions of a class of subcubic graphs
    Carla Lintzmayer, Guilherme Mota, Lucas Rocha and Maycon Sambinelli
27. On tessellations and graph operations: Adding pendant and false twin vertices
    Alexandre De Abreu, Celina De Figueiredo, Franklin Marquezino and Daniel Posner
28. Reducing the Time Complexity of Computing Square Roots with Girth at Least Six of a Graph
    Cristopher Carcereri, Aleffer Rocha and Renato Carmo
29. On iterated clique graphs with exponential growth
    Miguel Pizaña and Ismael Robles
30. Critical generators of $K_5$
    Sambinelli Gabriela Ravenna and Liliana Alcon
31. Containment among classes of interval graphs with interval count $k$
    Lívia Medeiros, Fabiano Oliveira and Jayme Szwarcfiter

32. On cycle-free-CPT posets
    Liliana Alcón, Noemí Amalia Gudiño and Marisa Gutierrez

33. Chordal Thinness
    Bernardo Amorim, Gabriel Coutinho and Vinicius dos Santos

34. On two variants of split graphs
    Luciano Grippo and Verónica Moyano

35. Monkey Hash Map: a highly performant thread-safe map without locks
    Judismar Arpini Junior and Vinícius G. Pereira de Sá

36. Clique problems in 3D molecular prediction
    João Alfredo Holanda Bessa Neto, Clarice Santos, Rosiane de Freitas, Micael Oliveira, Jonathas Nunes and Kelson Mota

37. COVID-19 mortality prediction - Perceptron and Random Forest applications
    João Pedro Marcelino Terra, Luerbio Faria and Fabiano Oliveira

38. Restricted Hamming-Huffman trees
    Min Lin, Fabiano Oliveira, Paulo Pinto, Moysés Sampaio Jr. and Jayme Szwarcfiter

39. A simple proof of the bijection between Minimal Feedback Arc Sets and Hamiltonian Paths in tournaments
    Rafael Schneider and Fábio Botler

40. Control flow graph, formal verification and constraint programming techniques
    Jesse Deveza, Lanier Santos, Rosiane de Freitas and Lucas Cordeiro

41. FPT algorithm for feedback vertex set in reducible flow hypergraphs
    Luerbio Faria, André L. P. Guedes and Lilian Markenzon

42. Spectral properties of threshold $k$-uniform hypergraphs
    Lucas Portugal and Renata Del-Vecchio

43. On a semidefinite relaxation for the maximum $k$-colourable subgraph problem

Marcel K. de Carli Silva, Gabriel Coutinho, Rafael Grandsire and Thiago Oliveira

44. Positive semidefiniteness of $A\alpha(G)$ on some families of graphs with $k$ cycles
Carla Oliveira, André Brondani and Victor Melquiades

45. On total coloring of subcubic graphs
Luerbio Faria, Mauro Nigro and Diana Sasaki

46. Neighbor distinguishing coloring for cacti graphs
Vinícius De Souza Carvalho, Maycon Sambinelli and Carla Negri Lintzmayer

47. Edge-Sum Distinguishing game
Deise L. de Oliveira, Danilo Artigas, Simone Dantas and Atílio G. Luiz

48. The $(2, 1)$-total number of powers of paths and powers of cycles
M. M. Omai, C. N. Campos and Atílio G. Luiz

49. Elecciones con Simetrías
Claudia De la Cruz and Miguel Pizaña

50. NP-Hardness of perfect rainbow polygons
David Flores-Peñaloza and Andrés Fuentes-Hernández

51. Parameterized complexity of computing maximum minimal blocking and hitting sets
Julio Araujo, Marin Bougeret, Victor Campos and Ignasi Sau

52. Theoretical and empirical analysis of algorithms for the max-npv project scheduling Problem
Isac M. Lacerda, Rosiane de F. Rodrigues, Eber A. Schmitz and Jayme L. Szwarcfiter

53. Some variations of the Tower of Hanoi and their graph properties
Lia Martins, Meng Hsu, Raquel Folz and Rosiane De Freitas

54. The Conflict-Free coloring game and cliques
Paola Tatiana Huaynoca, Miguel Palma and Simone Dantas

55. Hardness of general position games
Ullas Chandran S.V., Sandi Klavzar, Neethu P. K. and Rudini Sampaio

56. Notes on graph variations of the NIM game
    Raquel Folz, Meng Hsu, Lia Martins and Rosiane de Freitas
57. On the Helly Number of trees
    Moisés Carvalho, Simone Dantas, Mitre Dourado, Daniel Posner and Jayme Szwarcfiter
58. On the Biclique Graphs of Circular Arc Bigraphs
    Fabricio Schiavon Kolberg, Marina Groshaus and André L. P. Guedes
59. Tree 3-spanners on prisms of graphs Renzo Gomez, Flavio K. Miyazawa and Yoshiko Wakabayashi
60. Extendiendo Gráficas Cuadrado-complementarias
    Ariadna Juarez-Valencia and Miguel Pizaña
61. The Terminal Connection Problem on Rooted Directed Path Graphs is NP-complete
    Alexsander Melo, Celina Figueiredo, Ana Silva and Uéverton Souza
62. Subdivisions with Parity in Digraphs
    Marcus Vinicius Martins Melo and Ana Karolinna Maia
63. The absolute oriented clique number problem is NP-complete
    Erika Morais Martins Coelho, Hebert Coelho, Luerbio Faria, Mateus de Paula Ferreira and Sulamita Klein
64. Hard instances for the maximum clique problem
    Rodrigo Nogueira, Victor Campos and Renato Carmo
65. O Número Cromático Total de Grafos Split 2-admissíveis
    Diego Amaro Costa, Sulamita Klein and Fernanda Couto
66. Neighbour-distinguishing edge-labeling of powers of paths
    Luis Gustavo Da Soledade Gonzaga and Christiane Neme Campos
67. Hunting a conformable fullerene nanodisc that is not 4-total colorable
    Mariana Cruz, Celina Figueiredo, Diana Sasaki, Marcus Vinicius Tovar Costa and Diego Nicodemos
68. A New Bound for the Sum of Squares of Degrees in a Class 2 Graph
    Thiago Cunha and Leandro Zatesko

69. Characterization of balanced graphs within claw-free graphs
Lucía Busolini, Guillermo Durán and Martín D. Safe