

Eranda Dragoti-Çela

Curriculum Vitæ

Institute of Discrete Mathematics

TU Graz

Steyrergasse 30, 8010 Graz

+43-316-873-5366

cela@math.tugraz.at

<http://www.math.tu-graz.ac.at/cela>

ORCID: 0000-0002-5099-8804

Academic Education

- 2001 **Habilitation (Applied Mathematics)**, Graz University of Technology, Austria
- 1995 **Ph.D. Degree (Dr.Techn.)**, Graz University of Technology, Austria
- 1992 **Diploma Degree (Dipl.-Ing.)**, University of Tirana, Albania

Employment

- 2007–Present **Associate Professor**, Institute of Discrete Mathematics, Graz University of Technology, Austria
- 2002–2007 **Head of the Quantitative Research Group**, FSC Financial Soft Computing, Vienna, Austria
- 2004–2005 **maternity and childcare leave**
- 2002–2002 **Associate Professor**, Institute of Optimization and Discrete Mathematics, Graz University of Technology, Austria
- 2001–2002 **maternity and childcare leave**
- 1999–2000 **Assistant Professor**, Institute of Optimization and Discrete Mathematics, Graz University of Technology, Austria
- 1996–1999 **Postdoctoral Researcher**, Institute of Optimization and Discrete Mathematics, Graz University of Technology, Austria

Main Areas of Research and Important Research Results

My research topics include:

- **Polynomially solvable special cases of NP-hard combinatorial optimization problems and their recognition:** We have identified polynomially solvable special cases of classical hard problems in combinatorial optimization such the quadratic assignment problem (QAP) [13, 10], the travelling salesman problem (TSP) [11] and the Path TSP [9]. We have also considered the extension of specific results as the ones mentioned above to the more general quadratic unconstrained binary optimization problem (QUBO) [5]. The recognition of polynomially solvable special cases is closely related to the recognition of special classes of matrices, as for example in [4].
- **Linearizability in combinatorial optimization:** We have identified sufficient and/or necessary conditions under which the quadratic or higher-order objective functions of certain combinatorial optimization problems can be equivalently formulated as linear objective functions [12, 7, 1].
- **Structural and algorithmic properties of graphs:** We have considered representations of

graphs as edge intersection graphs of paths on a grid (EPG graphs) and have obtained results on the bend number and the monotonic bend number of certain graphs classes, including the computation of these numbers and corresponding bounds, as well as the characterizations of graphs classes with a given (monotonic) bend number [6, 3],

- **Optimization problems in finance, in particular portfolio optimization models:** We have investigated models of portfolio optimization to incorporate ordinal inputs, e.g. preference orders for the assets in portfolio [8]. For the integration of more than one preference order we have developed and analyzed robust optimization models and order aggregation models from social choice theory [2].

Selected Publications, since 2015

- [1] Eranda Çela, Bettina Klinz, Stefan Lendl, Gerhard J. Woeginger, and Wulf Lasse. A linear time algorithm for linearizing quadratic and higher-order shortest path problems. *Mathematical Programming (Series B)*, 210:165–188, 2025. DOI: <https://doi.org/10.1007/s10107-024-02086-z>.
- [2] Eranda Çela, Stefan Hafner, Roland Mestel, and Ulrich Pferschy. Integrating multiple sources of ordinal information in portfolio optimization. *Annals of Operations Research*, 346:1967–1995, 2025. DOI: <https://doi.org/10.1007/s10479-025-06495-x>.
- [3] Eranda Çela and Elisabeth Gaar. On k -bend and monotonic ℓ -bend edge intersection graphs of paths on a grid. *Discrete Applied Mathematics*, 331:88–103, 2023. DOI: <https://doi.org/10.1016/j.dam.2023.01.010>.
- [4] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. Recognising permuted demidenko matrices. *Operations Research Letters*, 51:494–500, 2023. DOI: <https://doi.org/10.1016/j.orl.2023.07.008>.
- [5] Eranda Çela and Abraham Punnen. Complexity and polynomially solvable special cases of QUBO. In Abraham Punnen, editor, *The Quadratic Unconstrained Binary Optimization Problem: Theory, Algorithms and Applications*, chapter 3, pages 57–95. Springer, Cham, 2022. DOI: https://doi.org/10.1007/978-3-031-04520-2_3.
- [6] Eranda Çela and Elisabeth Gaar. Monotonic representations of outerplanar graphs as edge intersection graphs of paths on a grid. *Journal of Graph Algorithms and Applications*, 26(4):519–552, 2022. DOI: 10.7155/jgaa.00606.
- [7] Eranda Çela, Bettina Klinz, Stefan Lendl, James Orlin, Gerhard J. Woeginger, and Lasse Wulf. Linearizable special cases of the quadratic shortest path problem. In *Proceedings of the 47th International Workshop on Graph-Theoretic Concepts in Computer Science, WG 2021*, volume 12911 of *Lecture Notes in Computer Science*, pages 245–256, 2021. DOI: https://doi.org/10.1007/978-3-030-86838-3_19.
- [8] Eranda Çela, Stefan Hafner, Roland Mestel, and Ulrich Pferschy. Mean-variance portfolio optimization based on ordinal information. *Journal of Banking and Finance*, 122:Article Number 106022, 2021. DOI: <https://doi.org/10.1016/j.jbankfin.2020.105989>.
- [9] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. Travelling salesman paths on Demidenko matrices. *Discrete Applied Mathematics*, (in press), 2021. DOI: <https://doi.org/10.1016/j.dam.2021.11.019>.

- [10] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. New special cases of the quadratic assignment problem with diagonally structured coefficient matrices. *European Journal of Operational Research*, 267(3):818–834, 2018. DOI: <https://doi.org/10.1016/j.ejor.2017.12.024>.
- [11] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. The multi-stripe travelling salesman problem. *Annals of Operations Research*, 259:21–34, 2017. DOI: <https://doi.org/10.1007/s10479-017-2513-4>.
- [12] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. Linearizable special cases of the QAP. *Journal of Combinatorial Optimization*, 31:1269–1279, 2016. DOI: <https://doi.org/10.1007/s10878-014-9821-2>.
- [13] Eranda Çela, Vladimir G. Deineko, and Gerhard J. Woeginger. Well-solvable cases of the QAP with block-structured matrices. *Discrete Applied Mathematics*, 186:56–65, 2015. DOI: <https://doi.org/10.1016/j.dam.2015.01.005>.

Publication list: <https://orcid.org/0000-0002-5099-8804>

Miscellaneous, since 2015

Third-party funding

- 2024– currently **FWF Project 10.55776/DOC183**, *doc.funds*, “Discrete Mathematics in Teams” (coadviser of one of 10 projects)
- 2024– currently **FFG Project FO999910233**, “Artificial Intelligence for Improved Container Loading Efficiency” (consortium member)
- 2022–2024 **FFG Project FO999893924**, *Kleinprojekt*, “Robuste Taktische Transportplanung” (consortium member)

Community service

- 2023 **Organizing committee member**, 49th Annual Meeting of the EURO Working Group on Operational Research Applied to Health Services (ORAHS2023)
- 2022 **Program committee member**, 19th International Symposium on Experimental algorithms (SEA2021)
- 2021–2026 **Co-organizer**, Austrian Day of Women in Mathematics (ADWiM), Annual Meeting
- 2014 **Co-organizer**, International Workshop “Tractable special cases of hard combinatorial optimization problems”
- 2014–2023 **Exam committee member for several PhD Thesis**, Universität Graz, TU Graz, Universität Klagenfurt, Politecnico di Torino, Warwick Business School
- 2020 **Selection committee member**, ÖGOR Prize Master Thesis
- 2020–2025 **Peer reviewer for around for 15 different scientific journals**, (5–8 reviews every year)

Supervisor experience

- since 2015 **Supervisor and co-supervisor**, 3 PhD, 18 Master, 28 Bachelor
- currently **Supervisor and co-supervisor**, 2 PhD, 4 Master, 1 Bachelor

Science to public

since 2009 **Co-organizer and speaker**, Lange Nacht der Forschung (2022), Mathe macht Spaß (Talks in Schools 2019, 2020,2024,2025,2926), FIT (Frauen in der Technik 2017)