Third Sevilla MINLP Workshop
Euro Mini Conference
Institute of Mathematics of the University of Seville (Spain)
March 30-31, 2023

FINAL REPORT

Aim and purpose of the conference

The number of real-world applications that can be modelled and solved by means of mixed-integer nonlinear programming (MINLP) is growing, thanks to the advances in software and hardware. Therefore, the MINLP community is also growing, and demands events in which both academics and practitioners gather and discuss the latest advances both in methodology and applications of MINLP.

Two such workshops were organized in Sevilla (Spain) in 2010 (The 2010 Exploratory Workshop on MINLP, organized by Emilio Carrizosa, Laureano F. Escudero, Marco A. Lopez, and Justo Puerto, with around 40 attendants) and 2015 (The Second Sevilla MINLP Workshop, organized within a COST project by Emilio Carrizosa and Justo Puerto, with a similar number of attendants).

With this in mind, we organized the *Third Sevilla MINLP Workshop* in March 30-31, 2023, as a EURO Mini Conference (EUROmC).

Location

The province of Seville is the largest (14,000 km²) and most highly populated (1.8 million) in Andalusia. Its location provides excellent connections with the rest of Spain. Arguably, Seville is a commercial, artistic and cultural hub of the south of the Iberian Peninsula. Seville's assets as a well-equipped meeting and conference city that does not end, by any means. Seville, besides outstanding monuments and its well-known beauty (see picture below), also offers cultural activities and leisure areas, and a complete range of hotels and restaurants, where attendees can relax after the conference sessions.

The conference took place at the Institute of Mathematics of the University of Seville (IMUS), https://www.imus.us.es/www/?lang=GB . This institute has over a hundred ordinary members, all of them researchers in different areas of mathematics who belong to the University of Seville. Besides, the IMUS also counts with over 20 PhD students in Mathematics and is involved in three Master Programs. The IMUS is regularly visited by top international researchers in mathematics.

Program

The workshop had 16 speakers, including two plenary talks (Professors Martin Schmidt and Adrian S. Lewis), and four sessions. Lunches were offered at a restaurant nearby. The workshop also included a visit to Seville Historical Centre, and a gala dinner. We now show the program in detail:

March 30 - FIRST DAY

9:30/10:00: Opening Session (IMUS Director Justo Puerto, Local Organizer Federico Perea, Scientific Committee Laureano Escudero)

- **10:00/11:00: Martin Schmidt** Trier University (Germany): (Plenary talk) - Block Decomposition of Large-Scale MINLPs and (Penalty) Alternating Direction Methods: Some Theory, the Feasibility Pump, and Applications
  Chair: Laureano Escudero

11:00/11:30: Coffee Break

11:30/13:00: SESSION ONE (Chair: Eligius M.T. Hendrix)

- **11:30/12:00: Adriana Nicolae** Babeș-Bolyai University (Romania): Alternating projections in metric spaces with bounded curvature

- **12:00/12:30: Leo Warnow** Technische Universität Ilmenau (Germany): An image space method for multi-objective mixed-integer convex optimization
- **12:30/13:00: Eligius M.T. Hendrix** Universidad Málaga (Spain): Using the resource constraint formulation and decomposition to solve MINLP problems

13:00: Lunch

14:30/16:00: SESSION TWO (Chair: Jan Kronqvist)

- **14:30/15:00: Florian Fontan** Artelys France (France): Latest developments for mixed-integer nonlinear programming in Artelys Knitro
- **15:00/15:30: Ignacio E. Grossmann** Carnegie Mellon University (USA): Modeling hierarchical systems via nested generalized disjunctive programming

- **15:30/16:00: Jan Kronqvist** KTH Royal Institute of Technology (Sweden): SHOT - The Supporting Hyperplane Optimization Toolkit solver

16:00/16:30: Coffee Break

16:30/18:00: SESSION THREE (Chair: Federico Perea)

- **16:30/17:00: Antonio Rodríguez-Chía** Universidad de Cádiz (Spain): A further study of single allocation hub location problem
- **17:00/17:30: Jose Luis Sainz-Pardo Auñón** Universidad Miguel Hernández (Spain): Decomposing Unrestricted Binary Quadratic Programing problems
- **17:30: Open Problems**

19:00/20:30: Visit: Sevilla historical center

20:30/22:30: Gala Dinner: Restaurant "El Traga"

March 31 - SECOND DAY

9:30/11:30: SESSION FOUR (Chair: Moritz Link)

- **9:30/10:00: Laureano F. Escudero** Universidad Rey Juan Carlos (Spain): Strong formulations for mixed integer quadratic modeling MIQM

- **10:00/10:30: Lavinia Amorosi** La Sapienza (Italy): A Mathematical Programming Approach to Sparse Canonical Correlation Analysis

- **10:30/11:00: Can Li** Davidson School of Chemical Engineering, Purdue University (USA): Selecting convex relaxations in a branch-and-bound algorithm using machine learning

- **11:00/11:30: Moritz Link** Universität Konstanz (Germany): Computing enclosures for multiobjective mixed-integer nonconvex optimization problems with application to energy supply networks

11:30/12:00: Coffee Break

- **12:00/13:00: Adrian S. Lewis** Cornell University (USA): (Plenary talk) - How hard is nonconvex nonsmooth optimization?
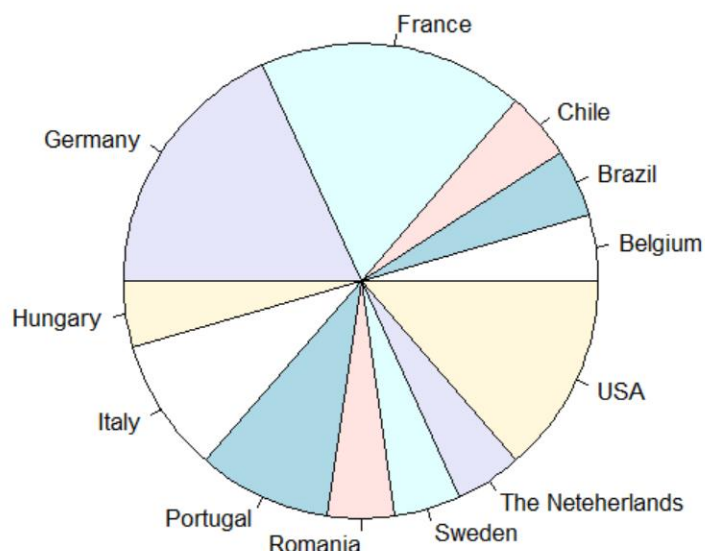 Chair: Genaro López

13:00/13:30: Closing Session

13:30: Lunch

Attendants:

We had 44 participants in this workshop, coming from institutions in 13 different countries (Belgium, Brazil, Chile, France, Germany, Hungary, Italy, Portugal, Romania, Spain, Sweden, The Neteherlands, USA), and 2 continents (Europe, America).

Not counting Spain, a piechart of the distribution of countries is:

The complete list of participants is:

Alves, Maria João. University of Coimbra (Portugal)
Amorosi, Lavinia. La Sapienza University (Italy) (Italy)
Ayala , Jonathan. Estadual Paulista University (Brazil)
Baldomero Naranjo, Marta. University of Cadiz (Spain)
Benatti, Stefano. University of Trento (Italy)
Bernal González, Luis. Universidad de Sevilla (Spain)
Cerulli, Martina. ESSEC Business School (France)
Díaz Ríos, Daniel. University of La Laguna (Spain)
Domínguez Benavides, Tomás. Universidad de Sevilla (Spain)
Eggen, Carl. University of Konstanz (Germany)
Escudero, Laureano. Rey Juan Carlos University (Spain)
Espínola, Rafael. Universidad de Sevilla (Spain)
Fischetti, Martina. European Commission Research center (Spain)
Fontan, Florian. Artelys France (France)
G.-Tóth, Boglárka. University of Szeged (Hungary)
Granda Chico, Bibiana. Complutense University (Spain)
Grossman, Ignacio. Carnegie Mellon University (USA)
Hendrix, Eligius MT. University of Malaga (Spain)
Henggeler Antunes, Carlos. University of Coimbra (Portugal)

Japón Pineda, Mª Ángeles. Universidad de Sevilla (Spain)

Kronqvist, Jan. KTH Royal Institute of Technology (Sweden)

Labbè, Martine. Université Libre de Bruxelles (Belgium)

Lewis, Adrian. Cornell University (USA)

Li, Can. Purdue University (USA)

Link, Moritz. University of Konstanz (Germany)

Ljubic, Ivana. ESSEC Business School (France)

López Acedo, Genaro. University of Seville (Spain)

Lorenzo Ramirez, Josefa. Universidad de Sevilla (Spain)

Mesa López-Colmenar, Juan Antonio. Universidad de Sevilla (Spain)

Moreno, Eduardo. Universidad Adolfo Ibáñez (Chile)

NICOLAE, ADRIANA. Babeș-Bolyai University (Romania)

Nouwens, Stefan. Shell (The Neteherlands)

Perea Rojas-Marcos, Federico. University of Seville (Spain)

Pozo Montaño, Miguel Ángel. University of Seville (Spain)

Puerto Albandoz, Justo. Universidad de Sevilla (Spain)

Rodríguez Chía, Antonio . University of Cadiz (Spain)

Sainz-Pardo Auñón, José Luis. Miguel Hernandez University (Spain)

Salazar, Juan José. University of La Laguna (Spain)

Schmidt, Martin. University of Trier (Germany)

Temprano García, Francisco. University of Seville (Spain)

Torrejón Valenzuela, Alberto. University of Seville (Spain)

Valverde Martín, Carlos. Universidad de Sevilla (Spain)

Vanier, Sonia. Paris1 Panthéon-Sorbonne University - LIX (France)

Warnow, Leo. Ilmenau University of Technology (Germany)

Pictures:

Group photo first day

Group photo second day

Visit to Sevilla Historical Centre

<u>EURO support</u>

Thanks to the EURO financial support, the following expenses were covered:

- Accommodation of participants in the Students Residence Estanislao del Campo (1305 Euros)
- Three coffee breaks for all participants (580.8 euros)
- Two lunches for all participants (1742.4 euros)
- Trip and accommodation of one of the plenary speakers (Martin Schmidt) (910.1 euros)
- Administration costs per participant (1012.5 euros)

3SMINLP
Third Sevilla MINLP Workshop
March 30 - 31, 2023

Institute of Mathematics of the University of Seville (IMUS)

PLENARY SPEAKERS

Adrian S. Lewis
Cornell University, USA

Martin Schmidt
Trier University, Germany

SCIENTIFIC COMMITTEE

Laureano Escudero Bueno
Universidad Rey Juan Carlos, Spain

Justo Puerto Albandoz
Universidad de Sevilla, Spain

ORGANIZING COMMITTEE

Federico Perea Rojas-Marcos
Universidad de Sevilla, Spain

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instituto de matemáticas
universidad de sevilla

EURO

THE ASSOCIATION OF
EUROPEAN OPERATIONAL
RESEARCH SOCIETIES

UNIVERSIDAD DE SEVILLA

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DEPARTAMENTO DE
MATEMÁTICA APLICADA II