



SYMCOMP 2025



7th International Conference on Numerical and Symbolic Computation:
Developments and Applications
10-11 April, Lisbon, Portugal

7th International Conference on Numerical and Symbolic Computation Developments and Applications

PROGRAM

April, 10 - 11

ISEL – Instituto Superior de Engenharia de Lisboa

Lisboa, Portugal





7th International Conference on Numerical and Symbolic Computation: Developments and Applications.

April, 10- 11, 2025, ISEL, Lisboa, Portugal, ©ECCOMAS.

SYMCOMP 2025 – 7th International Conference on Numerical and Symbolic Computation:
Developments and Applications

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Editors: Maria Amélia Loja (IDMEC – IST; ISEL-CIMOSM), Joaquim Infante Barbosa (IDMEC - IST; ISEL-CIMOSM), André Carvalho (IDMEC – IST; ISEL-CIMOSM), Inês Jerónimo Barbosa (IDMEC – IST; ISEL-CIMOSM), Ana Martins (ISEL-CIMOSM; ISEL-CIMA, DM) e José Alberto Rodrigues (ISEL-CIMOSM; ISEL-CIMA, DM)

April 2025





1 – Introduction

The Organizing Committee of SYMCOMP 2025 – 7th International Conference on Numerical and Symbolic Computation: Developments and Applications warmly welcomes all participants and acknowledges the invaluable contributions of the authors, which are essential to the success of this event.

About SYMCOMP 2025

This Seventh International Conference on Numerical and Symbolic Computation is promoted by APMTAC (Associação Portuguesa de Mecânica Teórica, Aplicada e Computacional) and organized under the framework of IDMEC (Instituto de Engenharia Mecânica, IST, Universidade de Lisboa).

As an ECCOMAS Thematic Conference, SYMCOMP 2025 aims to bring together academic and scientific communities engaged in Numerical and Symbolic Computation across diverse fields, fostering collaboration and knowledge exchange.

Main Goals of SYMCOMP 2025

- To establish the state of the art and highlight innovative applications of Numerical and Symbolic Computation in various disciplines, including Engineering, Physics, Mathematics, Economics, Management, Architecture, and more.
- To promote the exchange of ideas and the dissemination of research within the broad scope of Numerical and Symbolic Computation.
- To encourage the participation of young researchers in scientific conferences.
- To facilitate networking among APMTAC members (Portuguese Society for Theoretical, Applied, and Computational Mechanics) and other scientific organizations dedicated to computation, while also fostering new memberships.

A Call for Engagement

We invite all participants to maintain a proactive and collaborative spirit, engaging in discussions, exchanging ideas, exploring research topics, and seeking future partnerships to advance the field.

Acknowledgments

The Organizing Committee of SYMCOMP 2025 extends its deepest gratitude to all colleagues involved in the Scientific Committee, Advisory Committee and Secretariat for their dedication and cooperation. We hope everyone has enjoyed contributing to this project, which we are confident will continue to thrive in the future. Our thanks to you all.

Amélia Loja (IDMEC – IST; ISEL-CIMOSM), Joaquim Barbosa (IDMEC - IST; ISEL-CIMOSM), André Carvalho (IDMEC – IST; ISEL-CIMOSM), Inês Barbosa (IDMEC – IST; ISEL-CIMOSM), Ana Martins (ISEL-CIMOSM; ISEL-CIMA, DM) and José Alberto Rodrigues (ISEL-CIMOSM; ISEL-CIMA, DM)



2 – CONFERENCE BOARD

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Email : amelia.loja@isel.pt, ; amelialoja@tecnico.ulisboa.pt

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Maria José Branquinho

IDMEC - IST – Instituto de Engenharia Mecânica

CPM - Centro de Projecto Mecânico

Av. Rovisco Pais, 1, 1049 - 001 Lisboa

Email: mariabranquinho@tecnico.ulisboa.pt Tel: (+351) 218417351



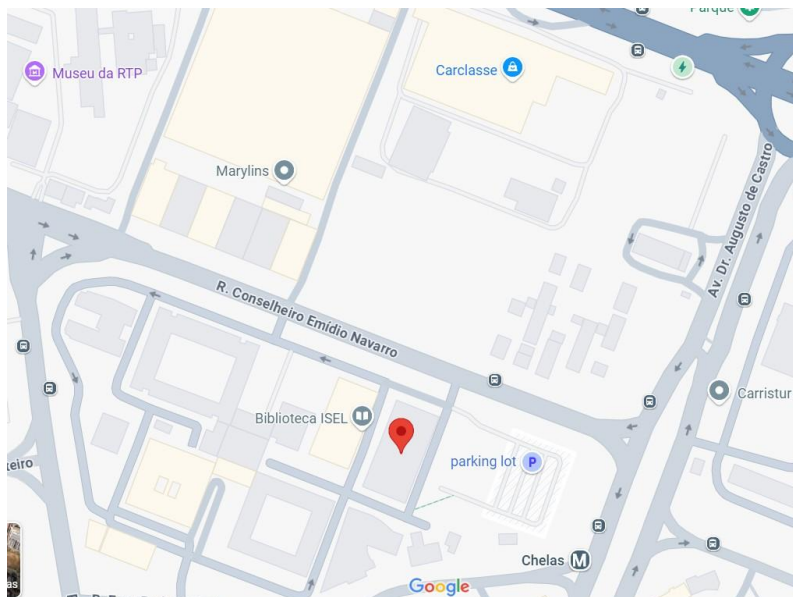
Registration on SYMCOMP2025

Until Monday, 31/03/2025

PLACE OF THE EVENT

ISEL – Instituto Superior de Engenharia de Lisboa, Edifício C, Auditório Eng. Ferreira Cardoso, Rua Conselheiro Emídio Navarro, 1, 1959-007 Lisboa.

<https://maps.app.goo.gl/oYoAQysPfy9JcZAT9>



Coffee break

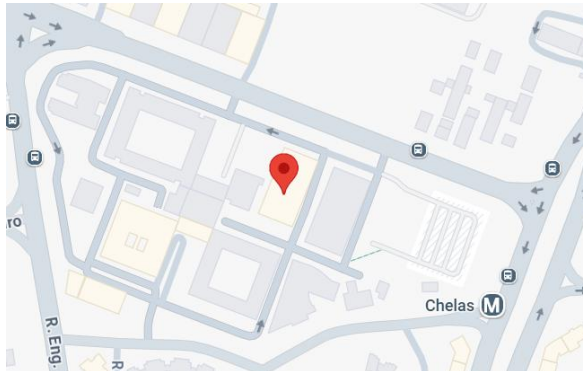
Coffee break will take place at the Conference hall and is open to all the participants. We ask you please to use always your identification.



Lunches

The lunch will take place at restaurant located at ISEL – Instituto Superior de Engenharia de Lisboa, Edifício A . Rua Conselheiro Emídio Navarro, 1, 1959-007 Lisboa

<https://maps.app.goo.gl/FfTKJpDfhBZ2kpmF8>



Conference dinner

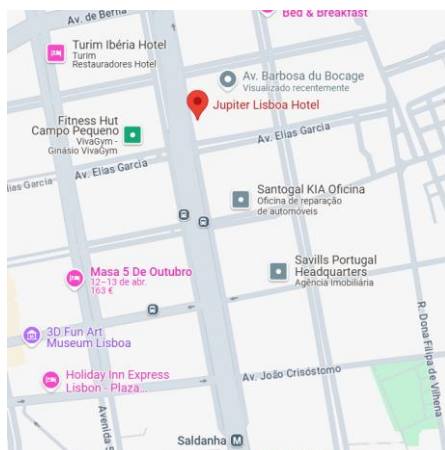
The Conference dinner will take place at the restaurant of Jupiter Lisboa Hotel, Avenida da República, 46, 1050-195 Lisboa, Thursday, 20:00h.

Link: <https://maps.app.goo.gl/ArkJ8tVgqB9E4aUp9>

Wolfram/Alpha Pro Awards will be delivered during the dinner.

Participants should arrive there by their own.

Further details will be provided during the conference.





Oral – In-person presentation

Online – Online live

THURSDAY, APRIL, 10

ISEL – Lisbon School of Engineering -Building C

OPENING CEREMONY: 08:15 – 08:25 – (Room A)

SP 01 Oral	PLENARY SESSION I (Room A) – CHAIR: Prof. Amélia Loja Joining by Forming of Busbars for Electric Distribution Systems <i>Professor Paulo Martins, Instituto Superior Técnico, Universidade de Lisboa</i>	08:30 - 09:15
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ID A06 IL01 Online	INVITED LECTURE I (Room A) – CHAIR: Prof. Ana Neves Higher Order Equivalent Layer-wise Theory for Multifield Analysis of Curved Laminated Structures <i>Prof. F. Tornabene, Dr. M. Viscoti and Prof. R. Dimitri University of Salento, Lecce, Italy</i>	09.20 - 09.50
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SESSION I (Room A): Computation Techniques in Fluid Flows and Control CHAIR: Prof. Aleksandr Cherniaev and Prof. Christina Katsamaki		09:50 – 10:50
ID	COMMUNICATION TITLE	AUTHORS
A01 Oral	Implementation of an SPH Solver for Quasi-Incompressible Fluids in JULIA	Aleksandr Cherniaev
A53 Online	Optimizing Hypersonic Intakes Through 1D-Based Design Exploration and Multi-Objective Surrogate Modeling	Ibrahim Gül, Bayram Celik
A60 Oral	Some Computational Tools for Solving a Selection of Problems in Control Theory	Christina Katsamaki, Alexander Demin, Fabrice Rouillier



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SESSION II (<i>Room B</i>): Algebras Structures and Graphic Topology		09:50 - 10:50
CHAIR: Prof. Ana Martins		
ID	COMMUNICATION TITLE	AUTHORS
A22 Online	Study of Combinatorial Structures Associated with TORTKARA Algebras	Jesús Baena
A32 Online	Some Results on Graphic Topology Defined on Tournaments	Inés Mora-Caro, Desamparados Fernández-Ternero
A08 Online	Computational Treatment of the Hierarchy of General and Evolution Algebras	Adolfo Vázquez Ruiz, Rafael Vázquez Ruiz, Juan Núñez Valdés

COFFEE BREAK (10:50 – 11:10)

SESSION III (<i>Room A</i>): Computational Mechanics I		11:10 – 12:30
CHAIR: Prof. Miguel Neves and Prof. André Carvalho		
ID	COMMUNICATION TITLE	AUTHORS
A13 Oral	Moment Integration Scheme for Higher-Order Virtual Elements In Inelastic Problems	Yongbin Choi, Tobias Bode, Philipp Junker
A14 Oral	Automating the Derivation of Equations for 1D Mass-Spring-Damper Models in Matlab	Miguel Neves
A51 Oral	Damping from Thermoelasticity in Structures Under Torsional Loading	André Carvalho
A67 Oral	A Spring-cable Multibody Model for Energy Absorbing Structures in Railway Vehicle Crashworthiness	João Milho, David Bronze

LUNCH (12.30-14.00)

THURSDAY, APRIL, 10

ISEL – Lisbon School of Engineering -Building C

ID IL02 Online	INVITED LECTURE II (Room A) CHAIR – Prof. Amélia Loja Agentic AI in Healthcare: a New Era Has Arrived Dr. Eva Sousa, University of Hull, Hull, United Kingdom	14.00 - 14.30
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SESSION IV (Room A): Efficient Numerical Schemes for Singular Problems		14:35 – 15:35
CHAIR: Prof. Luísa Morgado and Prof. Luís Ferrás		
ID	COMMUNICATION TITLE	AUTHORS
A36 Oral	Numerical Simulation of Current Flows in Disordered Materials	Lara Carvalho, G. Carvalho, Luís Ferrás, Magda Rebelo, Luís Morgado, Maria Morgado
A55 Oral	Time-fractional Advection-diffusion Model for Transient Currents in Disordered Materials	Luís Morgado, Luísa Morgado, Luís Ferrás, Anselmo Falorca
A31 Oral	An IMEX Method for Nonlinear Time-fractional Diffusion Equations	Magda Rebelo, Luís Ferrás, Luísa Morgado, Luís Morgado

SESSION V (Room B): Orthogonal Polynomials, Special Functions and Applications		14:30–15:30
CHAIR: Prof. Zélia Rocha and Prof. Teresa Mesquita		
ID	COMMUNICATION TITLE	AUTHORS
A09 Oral	On Connection Coefficients of D-Orthogonal Polynomials in Terms of Orthogonal Polynomials	Teresa Mesquita, Zélia da Rocha
A10 Online	On Generating Functions of Some Perturbations of a Second-Order Self-Associated Orthogonal Sequence: An Approach Based on Symbolic Computations	Zélia da Rocha
A38 Online	Symbolic Computation Applied in the Context of Quantum Calculus	Ângela Macedo

COFFEE BREAK (15:30 – 15:50)

THURSDAY, APRIL, 10

ISEL – Lisbon School of Engineering -Building C

SESSION VI (<i>Room A</i>): Efficient Numerical Schemes for Singular Problems		15:50 – 17:10
CHAIR: <i>Prof. Magda Rebelo and Prof. Luís Ferrás</i>		
ID	COMMUNICATION TITLE	AUTHORS
A33 Oral	Finite Difference Schemes for Couette flows with Generalised Integral Viscoelastic Models	Elias Silva, Magda Rebelo, Luís Ferrás, Luís Morgado, Maria Morgado
A35 Oral	Finite Difference Methods for Fractional K-BKZ Models	Gonçalo Carvalho, L. Carvalho, Luís Ferrás, Magda Rebelo, Luís Morgado, Luísa Morgado
A39 Oral	Adaptive Mesh Algorithms for Distributed-Order Differential Equations	Maria Morgado, Luís Morgado, Luís Ferrás, Magda Rebelo
A42 Oral	Influence of Relaxation Functions on Viscoelastic Data Fitting: A Parameter Analysis	Luís Ferrás, Maria Morgado, Magda Rebelo, Luís Morgado

SESSION VII (<i>Room B</i>): Applications in Health Sciences and Technologies: Numerical Computation Developments		15:50 – 17:10
CHAIR: <i>Prof. Lina Vieira and Prof. Margarida Ribeiro</i>		
ID	COMMUNICATION TITLE	AUTHORS
A19 Oral	Measuring Thoracic Muscle by Chest CT to Foresee Sarcopenia in Post-Covid 19 Patients	Maria Margarida Ribeiro
A20 Oral	Amputations in Diabetics: Statistical Modeling and Trends in Portugal (2000–2023)	Elisabete Carolino
A30 Oral	Advanced Imaging of Parkinson's: Evaluating the Striatum and Substantia Nigra with Datscan Spect and T2W MRI	Luís Mesquita, Margarida Ribeiro, Lina Vieira
A54 Oral	Mathematical Modeling of Metabolic Reprogramming and Therapeutic Strategies in Non-Small Cell Lung Cancer: A Flux Balance and Variability Analysis Approach	José Rodrigues, Jacinta Serpa, João Lopes, Cindy Mendes, Luís Gonçalves

CONFERENCE DINNER – 20.00H

FRIDAY, APRIL, 11

ISEL – Lisbon School of Engineering -Building C

SP 02 Oral	<p>PLENARY SESSION II (<i>Room A</i>) – CHAIR: <i>Prof. Amélia Loja</i></p> <p>Developments in multimodal large language models</p> <p><i>Professor Arlindo Oliveira, Instituto Superior Técnico,</i></p> <p><i>Universidade de Lisboa</i></p>	08:30 - 09:15
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ID A04 IL03	<p>INVITED LECTURE III (<i>Room A</i>) – CHAIR: <i>Prof. Amélia Loja</i></p> <p>Incidence of Reputational Periodicity</p> <p><i>Prof. Peter Mitic (University College London)</i></p>	09.20 - 09.50
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ID IL04	<p>INVITED LECTURE IV (<i>Room A</i>) – CHAIR: <i>Prof. Cláudia Casaca</i></p> <p>Porous Burners: a Review of Modeling Approaches and Applications</p> <p>in the Energy Transition</p> <p><i>Prof. Isabel Malico (University of Évora)</i></p>	09.55 - 10.25
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COFFEE BREAK (10:30 – 10:50)

<p>SESSION VIII (<i>Room A</i>): Simulation and Optimization of Fluid Flow, Heat and Mass Transfer</p> <p>CHAIR: <i>Prof. Isabel Malico and Prof. Cláudia Casaca</i></p>		10:50 – 11:50
ID	COMMUNICATION TITLE	AUTHORS
A11 Oral	CFD Analysis of Jet Deflection in Thermal Recuperative Incinerators	Francisco Zdanowski, Isabel Malico
A23 Oral	Preliminary Simulation Results of a Molten Salt Thermal Storage Tank for Concentrated Solar Power	Júnior Mané, Isabel Malico, N. Domingues, P. Horta, Radia El Cadi.
A40 Oral	A Machine-Learning–based Framework for Efficient Turn-down Ratio Determination in Porous Burners	Sérgio Costa, Isabel Malico, Fernando Janeiro

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ISEL – Lisbon School of Engineering -Building C

SESSION IX (<i>Room B</i>): Fractional Differential Equations		10:50 – 11:50
CHAIR: Prof. José Alberto Rodrigues		
ID	COMMUNICATION TITLE	AUTHORS
A15 Online	Operator Techniques for The Solution of Caputo Fractional Differential Equations	Inga Telksniene
A25 Online	The Operational Spectral Tau Method to Approximate Solution of Functional Differential Equations	José Matos, Paulo Vasconcelos, José Matos
A26 Online	Doing Fractional Calculus in the Tau Toolbox	José Matos, Paulo Vasconcelos, José Matos
A37 Online	Grüss Type Inequalities Within the General Quantum Calculus	José Luis Cardoso

SESSION X (<i>Room A</i>): Sustainability and Digital Twins		11:50–12:30
CHAIR: Prof. Rui Ruben and Prof. João Milho		
ID	COMMUNICATION TITLE	AUTHORS
A52 Oral	How Teaching Methods Can Influence the Carbon Footprint	Rui Ruben, Luís Coelho, Judite Vieira, Marcelo Gaspar, Paulo Carvalho, Hachimi Abba, Jorma Sateri, Christian Gotz
A59 Oral	A Finite Element Model to Study Posterior Malleolus Surgery Approach	Guilherme Lopes, Rui Ruben, Inês Barbosa, Joana Contente, Sofia Dantas

SESSION XI (<i>Room B</i>): Computational in Operator Theory and Optimization		11:50 - 12:20
CHAIR: Prof. Ana Martins		
ID	COMMUNICATION TITLE	AUTHORS
A61 Online	Symbolic Computation Applied to Function Factorization Concept: The Rational Scalar Case	Ana Conceição, Jéssica Pires, Celestino Coelho
A62 Online	Computational Analysis of Levenberg-Marquardt Method in Nonlinear Least Squares Problems	Ana Conceição, Vasco Ricardo, Celestino Coelho

LUNCH (12.30-14.00)

FRIDAY, APRIL, 11

ISEL – Lisbon School of Engineering -Building C

ID IL05 Oral	INVITED LECTURE V (<i>Room A</i>) – CHAIR: Prof. João Milho Meshless Methods in Mechanics and Biomechanics: Current and Trend Applications Prof. Jorge Belinha, INEGI, ISEP – School of Engineering, Polytechnic of Porto	14.00 - 14.30
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SESSION XII (<i>Room A</i>): Machine and Deep Learning Techniques Applied to Computational Mechanics		14:30 – 15:30
CHAIR: Prof. Jorge Belinha and Prof. Inês Barbosa		
ID	COMMUNICATION TITLE	AUTHORS
A16 Oral	Neural Networks to Surrogate Bone Remodelling Analysis in the Calcaneus	Jorge Belinha, Ana Pais, Fernando Alves
A17 Online	A Convolutional Neural Network to Generate Unit Cell Geometries with Target Elastic Properties	Ana Pais, Jorge Lino Alves, Jorge Belinha
A18 Oral	Structural Topology Optimization of the Wheel's Spokes of NASA's Perseverance Rover Using an Advanced Discretization Technique	Daniel Rodrigues, Jorge Belinha, Jure Trdin

SESSION XIII (<i>Room B</i>): Artificial Intelligence Applications to Healthcare Datasets		14:30–15:30
CHAIR: Prof. Inês Barbosa and Prof. Eva Sousa		
ID	COMMUNICATION TITLE	AUTHORS
A02 Online	Synthetic Microscopic Platelets Images Generation Using Wgan-gp	Itunuoluwa Abidoye, Frances Ikeji, Charlie A.Coupland, Simon D. Calaminus, Eva Sousa
A12 Online	A Pilot Study on Fine-Tuning Named Entity Recognition for Clinical Tag Extraction Using Pretrained Language Models: the Tut-all Experience	Adeyemi Victor Gbadamosi, Alberto Moreno, Martin Deutsch, Nick Sander, Claire Cashmore, Eva Sousa
A56 Online	Improving PD-L1 Expression Prediction in non-Small Cell Lung Cancer Using Radiomic Analysis and Ensemble Machine Learning Models on Whole-Body vs 18F-FDG Lung PET/CT Data	Steven Olawale, Azeem Saleem, Ged Avery, Eva Sousa
A57 Online	Improving PD-L1 Expression Prediction in non-Small Cell Lung Cancer Using Radiomic Analysis and Deep Learning Models on Whole-Body VS Lung 18F-FDG PET/CT Data	Steven Olawale, Azeem Saleem, Ged Avery, Eva Sousa

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ISEL – Lisbon School of Engineering -Building C

SESSION XIV (<i>Room A</i>): Data Analytics and Forecasting CHAIR: <i>Prof. Ana Martins and Prof. Alda Carvalho</i>		15:30 – 16:30
ID	COMMUNICATION TITLE	AUTHORS
A34 <i>Online</i>	Analysis of Thoracic Aortic Aneurysm CTA Scans Using Spatial Statistics	Katalina Rodríguez, Alda Carvalho, R. Valente, José Xavier, António Tomás
A29 <i>Oral</i>	Statistical Analysis and Quantification of Ascending Thoracic Aortic Aneurysms Dynamics	Rodrigo Valente, André Mourato, Alda Carvalho, Moisés Brito, José Xavier, Stéphane Avril, António Tomás, José Fragata
A48 <i>Oral</i>	Short-Term Electric Grid Load Forecasting	Ana Martins, F. Pereira, F. Reis, Hiren Canacsinh, João Lagarto, M. Cardoso, Maria Amorim
A50 <i>Oral</i>	Reliability Analysis and Failure Forecast of Critical Components Under Warranty	José Sobral, Fyodor Subotin

SESSION XV (<i>Room B</i>): Computational Mechanics II CHAIR: <i>Prof. Ana Neves and Prof. Inês Barbosa</i>		15:30 – 16:30
ID	COMMUNICATION TITLE	AUTHORS
A63 <i>Oral</i>	Computational Modelling of Incident Solar Radiation and Application for Thermal Loads Calculation in Buildings	Abel Agostinho, Fernando Carreira, Cláudia Casaca
A64 <i>Oral</i>	Analytical and Numerical Study of Carbon/Epoxy Composite Plates Subjected to Uniaxial and Biaxial Loads	Afonso Leite
A65 <i>Oral</i>	Simulating Stresses and Strains in Solid Mechanics Directly from Images Using Convolutional Neural Networks	José Rodrigues, Beatriz Vieira, Stéphane Bordas, Saurabh Deshpande

COFFEE BREAK (16:30 – 16:50)

16:50 – 17:00 - Information about Submissions to Special Issues

**Mathematical and Computational Applications (MCA)
Mathematics in Computer Science (MCS)**

17:00 – CLOSURE