

Technical Program



COSIM 2021

**International Symposium
on Co-Simulation and Solver Coupling in Dynamics**



**May 24 and 25, 2021 – Online event
Laboratorio de Ingeniería Mecánica (LIM)
University of A Coruña – Ferrol, Spain**

COSIM 2021

An International Symposium on Co-Simulation and Solver Coupling in Dynamics

Online event – May 24 and 25, 2021

Chairmen

Francisco J. González
Javier Cuadrado

Laboratorio de Ingeniería Mecánica
<http://lim.ii.udc.es>
Escuela Politécnica Superior
University of A Coruña
Mendizábal s/n – 15403 Ferrol, Spain
E-mail: f.gonzalez@udc.es – javier.cuadrado@udc.es

Scientific Committee

Jorge Ambrósio, *Portugal*
Martin Arnold, *Germany*
József Kövecses, *Canada*
Pierangelo Masarati, *Italy*
Aki Mikkola, *Finland*
Roland Pastorino, *Belgium*
Bernhard Schweizer, *Germany*
Radu Serban, *USA*

Local Organizing Committee

Francisco J. González
Javier Cuadrado
Alberto Luaces
Borja Rodríguez

With the Support of



Endorsed by



SESSIONS AND SPEAKERS

	Monday 24	Tuesday 25
9.00 – 9.15	Welcome	
9.15 – 10.30	Methods I Krammer Koutras Olivier Rodríguez	Applications II Timmermans Sollich Zhang, S.-P. Lu
10.45 – 12.00	Applications I Jaiswal Osman Merino Escarabajal	Methods III González Zhang, R. Harutyunyan Arnold
12.00 – 13.00	Lunch break	
13.00 – 14.15	Software I Corral Rodas Kraft Tsokanas	Software II Vinnakota Tsokanas Tamellin Braun
14.30 – 15.30	Keynote lecture Benedikt	Methods IV Haid Docquier Éguillon
15.45 – 17.00	Methods II Genser Peiret Inci Benedikt	

Each session consists of three or four 15-minute video presentations, followed by a 15-minute Q&A slot for all the presentations in the session.

A total of 60 minutes have been allocated for the keynote lecture, of which the last 15 will be reserved for Q&A.

All times correspond to Central European Summer Time (UTC+2), the local time in Ferrol.

MONDAY 24

9.15 – NUMERICAL METHODS AND ALGORITHMS I

Start from non-trivial preconditions:

Initialization strategies for distributed co-simulation

M. Krammer, C. Schiffer, K. Schuch, K. Alekeish, T. Blochwitz, M. Benedikt
Virtual Vehicle GmbH / AVL List GmbH / ESI ITI

A new co-simulation approach for mechanical systems

E. Koutras, E. Paraskevopoulos, S. Natsiavas
Aristotle University

Comparison of X–T and X–X co-simulation techniques applied on railway dynamics

B. Olivier, O. Verlinden, G. Kouroussis
University of Mons

Evaluation of indicators for the accuracy and stability of explicit co-simulation schemes

B. Rodríguez, A. Zar, B. Spath, M. Á. Naya, F. González, R. Pastorino
University of A Coruña / Siemens Digital Industries Software

10.45 – APPLICATIONS I

A study of different friction force models of a hydraulic actuator in a combined multibody and hydraulic model

S. Jaiswal, J. Sopanen, A. Mikkola
Lappeenranta University of Technology

Co-simulation approach in stability analysis of hexapod robot

K. Osman
Zagreb University of Applied Sciences

Co-simulation of a sterilization plant using FMI

A. Merino, D. Hernández-Garrigues, S. Galán-Casado, D. Sarabia, C. Vilas
University of Burgos / Universidad Politécnica de Madrid / IIM-CSIC

Performance analysis in a 3UPS+RPU parallel robot of controllers designed using co-simulation

J. L. Pulloquina, V. Mata, Á. Valera, M. Valles, R. Escarabajal, P. Zamora
Universitat Politècnica de València

13.00 – SOFTWARE AND CYBER-PHYSICAL SYSTEMS I

A “digital twin” based cloud service featuring FMI co-simulation for automotive applications

I. Corral

Robert Bosch GmbH

A telematic control unit based co-simulation and test platform for control area network bus systems

J. Rodas, V. Barral, J. A. García-Naya, L. Castedo, C. J. Escudero

University of A Coruña

General parallelization approach for mechanical systems via co-simulation

J. Kraft, T. Meyer, B. Schweizer

Technical University Darmstadt

Three-level verification and validation approach for motorcycle subsystem testing using physical/virtual co-simulation

N. Tsokanas, L. Thielemans, B. Spath, R. Pastorino, B. Stojadinović

ETH Zurich / Siemens Digital Industries Software

14.30 – KEYNOTE LECTURE

Co-simulation governance – a path to credible system simulation

M. Benedikt

Virtual Vehicle GmbH

15.45 – NUMERICAL METHODS AND ALGORITHMS II

The effect of exact and approximated interface Jacobians at a model-based co-simulation of a helicopter

S. Genser, M. Benedikt, D. Watzenig

Virtual Vehicle GmbH / Graz University of Technology

Model-based interfacing in co-simulation

A. Peiret, A. Raoofian, F. González, J. Kövecses, M. Teichmann

McGill University / CMLabs Simulations

A comparison of offline and run-time adaptive co-simulation for 1D-3D mechatronic systems

E. O. Inci, J. Croes, J. Bosmans, M. Vermaut, W. Desmet

Flanders Make / KU Leuven

Trigger sequence for non-iterative co-simulation with different coupling time steps: a graph transformation approach

F. Holzinger, M. Benedikt, D. Watzenig

Virtual Vehicle GmbH / AVL List GmbH / Graz University of Technology

TUESDAY 25

9.15 – APPLICATIONS II

Haptic piano key based on a real-time multibody action model: mechatronic design and force feedback validation

S. Timmermans, N. Docquier, P. Fiset
Université Catholique de Louvain

Co-simulation of deep penetration laser beam welding by coupling adaptive smoothed particle hydrodynamics with a ray-tracing approach

D. Sollich, P. Eberhard, F. Fetzner
University of Stuttgart

Estimation of lane change intention of surrounding vehicle through co-simulation of vehicle dynamics and artificial intelligence

S.-P. Zhang, S.-W. Ahn, J.-Y. Choi, S.-H. Won, D.-H. Heo, T.-O. Tak
Kangwon National University

A co-simulation study case: Turbocharger rotors with squeeze film damper and ball bearings

D. Lu, P. Li, B. Schweizer
Shanghai Institute of Technology / Xi'an Jiaotong University / TU Darmstadt

10.45 – NUMERICAL METHODS AND ALGORITHMS III

Benchmark problems for co-simulation methods

A. Zar, F. González, B. Rodríguez, A. Luaces, M. Á. Naya, J. Cuadrado
University of A Coruña

Explicit co-simulation for coupled multibody systems with kinematic coupling constraints

R. Zhang, H. Zhang, A. Zannoni, A. Tasora, P. Masarati
Politecnico di Milano / Beihang University / Università di Parma

Coupled formulation for the modeling of a high-temperature superconductor-ferromagnet system

J. Dular, C. Geuzaine, M. Harutyunyan, S. Schöps, B. Vanderheyden
Technical University Darmstadt / University of Liège

How to verify worst case asymptotic error bounds for co-simulation algorithms

M. Arnold
Martin Luther University Halle-Wittenberg

13.00 – SOFTWARE AND CYBER-PHYSICAL SYSTEMS II

Modular co-simulation framework for multiple virtual vehicles in traffic

M. Vinnakota, P. Baumann, R. Srivathsan, S. Krust, O. Kotte

Robert Bosch GmbH

Development of an adaptive model predictive reference tracking controller for hard real-time hybrid simulation

N. Tsokanas, R. Pastorino, B. Peeters, B. Stojadinović

ETH Zurich / Siemens Digital Industries Software

Development of a multi-domain model for web handling machines

D. Richiede, I. Tamellin, A. Trevisani, M. Cattaruzza, S. Russo

University of Padova / Uteco Converting S.p.A.

Numerically stable co-simulation with FMI 3.0 using on-demand interpolation

R. Braun, R. Hällqvist, M. Eek, D. Fritzson

Linköping University / Saab Aeronautics

14.30 – NUMERICAL METHODS AND ALGORITHMS IV

Stability, accuracy and robustness analysis of the model-based corrector approach for explicit co-simulation

T. Haid, D. Watzenig, M. Benedikt

F. Porsche AG / Virtual Vehicle GmbH / Graz University of Technology

Coupled simulation of granular media and poly-articulated systems

N. Docquier, O. Lantsoght, F. Dubois, O. Brüls

Université Catholique de Louvain / Université de Montpellier / Université de Liège

Cautiously obtrusive solution to avoid rollback in iterative co-simulation algorithms (COSTARICA)

Y. Équillon, B. Lacabanne, D. Tromeur-Dervout

Université de Lyon / Siemens Industry Software

