COMSOL CONFERENCE
2017 ROTTERDAM

Final Program
WELCOME TO THE COMSOL CONFERENCE 2017

Over the course of 3 days, expand your skills in numerical simulation. Through a better understanding of multiphysics modeling and simulation applications, you’ll be better equipped and inspired to tackle your next design challenge.

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### WEDNESDAY OCTOBER 18

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<td>10:30AM</td>
<td>Demo Stations, Poster Session, Exhibition Open</td>
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<td>10:30AM</td>
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COMMUNITY EVENTS

BOAT TOUR
Wednesday, 7:30PM
Leuvenhoofd
Join us for a boat tour of the different harbors in Rotterdam and enjoy a view of the city skyline.

COCKTAIL RECEPTION
Wednesday, 4:30PM
Meet and greet fellow COMSOL® Software users.

POSTER SESSION
Thursday, 6:00PM - 7:00PM
View the posters and meet the authors.

LUNCH
Wednesday, 12:00PM - 1:00PM
Thursday, 12:00PM - 1:00PM
Friday, 12:00PM - 1:00PM

GALA DINNER
Thursday, 7:00PM - 8:30PM
Taste everything at this dinner buffet with relaxing atmosphere.

EXHIBITION
Wednesday, 10:30AM - Friday 1:00PM
Learn about exhibitors’ products and services.
COMSOL KEYNOTE
SVANTE LITTMARCK
PRESIDENT AND CEO, COMSOL, INC.
Wednesday, October 18
Svante Littmarck is the President and CEO of COMSOL, Inc. He cofounded the COMSOL group in 1986. In 2004, Littmarck received an honorary doctoral degree from the Royal Institute of Technology for the development and international reach of high quality software for scientific computations through his company COMSOL.

SCALING SIMULATION: COMPUTE, ACCESSIBILITY, AND USE OF EMERGING TECHNOLOGIES
STEPHAN GILLICH
DIRECTOR TECHNICAL COMPUTING AND AI GTM EMEA, INTEL DEUTSCHLAND GMBH
Thursday, October 19
We can look back to over two decades of computer driven simulation usage in engineering. An increase in compute performance, functionality and accessibility of the solutions allows the benefits of simulation to be scaled higher and wider.
Meanwhile Computer Aided Engineering is also being linked with several other technologies e.g. Internet of Things and Analytics using Artificial Intelligence.
In this presentation we will look at this ongoing development - what is possible on the hardware and software side, including the usage of emerging technologies not just today but also in the future.

FINITE ELEMENT ANALYSIS FOR LOUDSPEAKER DRIVERS AND SYSTEMS: “WHERE AND WHY?”
MATHIEU POBEDA
NEXO
Thursday, October 19
In this presentation, we will look at the big picture of all of the physics involved when designing a loudspeaker driver or system. We will then focus on some (mechanics, acoustics, fluid dynamics, etc.) To see where finite element analysis can be used through standard or optimization methods. We will finally look at what the simulation strategy is and what the benefits can be for an organization to use COMSOL Multiphysics®.

PAVING THE WAY TOWARD INVISIBLE HEARING IMPLANTS
PATRIK KENNES
COCHLEAR TECHNOLOGY CENTRE
Thursday, October 19
While most hearing aids carry sounds through the ear canal to the middle ear, the fully implantable Carina® System connects with the structures of the middle ear and carries sounds directly to the inner ear. During this talk, it will be demonstrated how the COMSOL Multiphysics® software was used to support the development of the different system components: a subcutaneous microphone that captures the sound through the skin, the MicroDrive™ actuator that drives the ossicles, and the inductive link to power the implant.
Carina and MicroDrive are trademarks or registered trademarks of Cochlear Limited.

CFD INTEGRATED IN THE DESIGN OF COMPLEX HYDRAULIC STRUCTURES
ARIE DE NIET
WITTEVEEN+BOS
Friday, October 20
Over the past decade, the increase in model quality and computer power has made it possible to apply computational fluid dynamics to hydraulic structures on a much larger scale. It is accepted more and more by our field and our clients as an essential tool in the design of new hydraulic structures, like navigation locks, discharge facilities, spills, and bridges. CFD is used to optimize a design and to prove that it meets the requirements of the client. In this presentation, we will show how CFD is integrated in several projects at Witteveen+Bos and how it innovates the design process.

MULTIPHYSICS SIMULATION (BEYOND SEMICONDUCTORS) AT STMICROELECTRONICS, ITALY
LUCIA ZULLINO
LUCEZIA GUARINO
STMICROELECTRONICS
Friday, October 20
Microelectronic systems are permeating more and more into our daily life, giving rise to new challenges for technology designers, who must interface their devices with the macroscopic world and sometimes embed them in severe environments. This talk is an overview of how multiphysics simulation is exploited at STMicroelectronics, Italy, to face this scenario in different contexts, including die-package interaction analysis and sophisticated wearable systems design as well as an epitaxial reactor thermofluidic simulation and a force sensor for a concrete integrity monitoring study. A thermomechanical simulation example will be detailed as a test case and discusses some of the ongoing challenges in such efforts.
COMSOL FUNDAMENTALS

INTRODUCTION TO THE APPLICATION BUILDER
Wednesday October 18, 3:00pm
Speaker: Thorsten Koch

The Application Builder, included in the COMSOL Multiphysics® software, allows you to wrap your COMSOL models in user-friendly interfaces. This minicourse will cover the two main components of the Application Builder: the Form Editor and the Method Editor. You will learn how to use the Form Editor to add buttons, sliders, input and output objects, and more. You will also learn how to use the Method Editor and other tools to efficiently write methods to extend the functionality of your apps.

AUTOMATING MODEL BUILDING USING THE APPLICATION BUILDER
Thursday October 19, 4:30pm
Speaker: Thorsten Koch

Learn how to use the Application Builder and the Method Editor to automate your model building, including setting up the geometry, material properties, loads and boundary conditions; meshing; solving; and extracting data. You will learn how the Application Builder can be a powerful tool in your modeling process.

SOLVERS: PART 1 UNDERSTANDING THE STATIONARY SOLVERS
Wednesday October 18, 1:00pm
Speaker: Jacob Yström

COMSOL Multiphysics® gives you precise control over the way in which your multiphysics models are solved. In this minicourse, we will cover the fundamental numerical techniques and underlying algorithms used for steady-state models, and explain the reasons behind the default solver settings. Building upon this knowledge, you will learn various techniques for achieving or accelerating convergence of nonlinear multiphysics models.

SOLVERS: PART 2 UNDERSTANDING THE TIME-DEPENDENT SOLVERS
Wednesday October 18, 3:00pm
Speaker: Jacob Yström

COMSOL Multiphysics® includes a set of powerful implicit time-stepping algorithms for fast and accurate solutions to transient models. In this minicourse, you will learn how to pick a solver based on the problem at hand, measure and control computational error, as well as check convergence and other salient issues in time-dependent analyses using the finite element method.

SOLVERS: PART 3 UNDERSTANDING SOLVERS AND HARDWARE
Friday October 20, 12:30pm
Speaker: Jacob Yström

Solving large and complex finite element models can take significant time and computational resources. In this minicourse, we will address the differences of the various solvers in the COMSOL Multiphysics® software in terms of their time and memory usage. Solver performance is also inextricably linked to computer architecture. We will address issues such as memory bandwidth, using parallel and cluster computing efficiently, and handling very large models.

EQUATION-BASED MODELING
Wednesday October 18, 9:00am
Speaker: Jacob Yström

Partial differential equations (PDEs) constitute the mathematical foundation to describe the laws of nature. This minicourse will introduce you to the techniques for constructing your own linear or nonlinear PDE systems. You will also learn how to add ordinary differential equations (ODEs) and algebraic equations to your model.

OPTIMIZATION
Thursday October 19, 4:30pm
Speaker: Tycho van Noorden

The Optimization Module will take you beyond traditional engineering analysis and into the design process. In this minicourse, you will learn to use gradient-based optimization techniques and constraint equations to define and solve problems in shape, parameter, and topology optimization, as well as inverse modeling. The techniques shown in this minicourse are applicable for almost all types of models.

POSTPROCESSING
Friday October 20, 9:00am
Speaker: Sven Friedel

When presenting your results, the quality of your postprocessing will determine the impact of your presentation. This minicourse will thoroughly explore the many tools in the Results node designed to make your data look its best. These include mirroring, revolving symmetric data, cut planes, cut lines, exporting data, joining or comparing multiple data sets, as well as animations. You look best when your data looks best!

MESHING
Thursday October 19, 8:30am
Speaker: Lorant Olasz

In this minicourse, we will walk you through the meshing techniques that are available to you in the COMSOL Multiphysics® software. We will introduce you to basic meshing concepts, such as how to tweak the meshing parameters for unstructured meshes. More advanced topics include working with swept meshes and creating mesh plots. You will also learn a useful technique for meshing imported CAD designs: how to hide small geometry features from the mesher.

GEOMETRY MODELING AND CAD IMPORT
Wednesday October 18, 9:00am
Speaker: Lorant Olasz

Whether you choose to construct a geometry in the COMSOL Desktop® or to import it from a CAD file, this minicourse will demonstrate some useful tools. Did you know that COMSOL Multiphysics® can automatically generate the cross section of a solid object and that you can use it for a 2D simulation? Or that you can directly import topographic data to create 3D objects? Generating a geometry is also about preparing selections for physics settings. By using the right selection tools, you can easily automate the modeling workflow even when this involves simulations on widely different versions of a geometry. Attend this minicourse to see a demonstration of these techniques and more.

DEPLOYING APPS USING COMSOL SERVER™
Wednesday October 18, 9:00am
Speaker: Thorsten Koch

Learn how to use COMSOL Server™ to deploy apps created with COMSOL Multiphysics® and spread the use of simulation. This minicourse will introduce you to working with the administration web page, managing user accounts and privileges, uploading and managing apps, monitoring usage, and configuring system-level settings.

HANDS-ON: CORE FUNCTIONALITY
Friday October 20, 9:00am
Speaker: Frank de Pont

This guided hands-on session will walk you through examples relying on the core functionality of COMSOL Multiphysics and will complement the material covered during the Meshing, Solvers, and Optimization minicourses.
RF heating, for example, address the coupling of electromagnetic structures, and scattering. Then, we will discuss transmission lines and waveguides, periodic resonant cavity analysis, antenna modeling, and the extraction of lumped parameters such as capacitance matrices. Applications include modeling of resistive heating and sensor design. Additionally, we will discuss the Charged Particle Tracing interface, with applications in mass spectrometry, accelerator physics, ion optics, and etching.

Speaker: Magnus Olsson

**ELECTROMAGNETICS: RESISTIVE AND CAPACITIVE DEVICES, AND PARTICLE TRACING**

Wednesday October 18, 3:00pm

In this minicourse, we will address the modeling of resistive and capacitive devices with the AC/DC Module and discuss the calculation of ion and electron trajectories using the Particle Tracing Module. We will also cover the calculation of electric fields under steady-state, transient, and frequency-domain conditions, as well as the extraction of lumped parameters such as capacitance matrices. Applications include modeling of resistive heating and sensor design. Additionally, we will discuss the Charged Particle Tracing interface, with applications in mass spectrometry, accelerator physics, ion optics, and etching.

Speaker: Magnus Olsson

**ELECTROMAGNETICS: MAGNETS, COILS, AND MOTORS**

Thursday October 19, 8:30am

Magnetic fields arise due to magnets and the flow of current. In this minicourse, you will learn about using the AC/DC Module to model static, transient, and frequency-domain magnetic fields that arise around magnets and coils. We will introduce various ways of modeling magnetically permeable materials as well as address motor and generator modeling.

Speaker: Magnus Olsson

**ELECTROMAGNETICS: WAVE ELECTROMAGNETICS, FROM RF TO OPTICAL**

Friday October 20, 9:00am

In this minicourse, we will cover the use of the RF Module and Wave Optics Module for simulating Maxwell’s equations in the high-frequency, electromagnetic wave regime. We will discuss applications in resonant cavity analysis, antenna modeling, transmission lines and waveguides, periodic structures, and scattering. Then, we will address the coupling of electromagnetic wave simulations to heat transfer, such as in RF heating, for example.

Speaker: Magnus Olsson

**RAY OPTICS**

Friday October 20, 12:30pm

In this minicourse, we will cover the use of the Ray Optics Module to simulate electromagnetic wave propagation in optically large geometries in which the wavelength is much smaller than the smallest geometric detail in the model. You will learn how to trace rays through homogeneous and graded-index media, model reflection and refraction at mirrors and lenses, analyze ray intensity and polarization, and investigate various optical aberrations. We will discuss application areas including cameras, spectrometers, laser focusing systems, and solar collectors. You will also learn how to apply the Ray Optics Module in a multiphysics context by considering structural and thermal effects.

HANDS-ON: ELECTROMAGNETICS

Wednesday October 18, 9:00am

This guided hands-on session will walk you through examples from electromagnetics and complement the material covered during the Electromagnetics minicourses.

Speaker: Rien Wesselink

**HANDS-ON: STRUCTURAL MECHANICS**

Thursday October 19, 8:30am

This guided hands-on session will take you through examples from structural mechanics and complement the material covered during the Structural Mechanics minicourses.

Speaker: Peter Yakubenko

**HANDS-ON: ACOUSTICS**

Friday October 20, 12:30pm

This guided hands-on session will take you through examples from acoustics and complement the material covered during the Acoustics minicourse.

Speaker: Kirill Shaposhnikov

**STRUCTURAL AND ACOUSTICS**

**STRUCTURAL MECHANICS: STATICS AND DYNAMICS**

Wednesday October 18, 1:00pm

In this minicourse, we will address the modeling of stresses, strains, and deflections in solid materials and mechanisms. Stationary, transient, and frequency-domain simulations will be covered. Shells, membranes, beams, and trusses will also be introduced. If you are interested in learning about the Structural Mechanics Module and Multibody Dynamics Module, this minicourse is for you.

Speaker: Peter Yakubenko

**STRUCTURAL MECHANICS: NONLINEARITY AND FATIGUE**

Wednesday October 18, 3:00pm

This minicourse builds upon static and dynamic modeling to address questions of material nonlinearity and fatigue. We will cover the various nonlinear material models used for modeling of metals, polymers, soils, and ceramics. Furthermore, we will discuss creep modeling and structural and thermal fatigue modeling.

Speaker: Peter Yakubenko

**ACOUSTICS AND VIBRATIONS**

Thursday October 19, 4:30pm

Acoustic pressure waves in fluids such as air or water interact with surrounding structures resulting in vibrations in solids and absorption in porous materials. Furthermore, in narrow structures, thermal and viscous loss in the fluid become significant and need to be included. In large domains, such as rooms or in the ocean, ray and diffusion methods need to be used. In this minicourse, we will use the Acoustics Module to demonstrate the simulation of these waves and their effects. You will also learn about recent news and additions to the COMSOL Multiphysics® software. Application areas include, but are not limited to: muffler design, mobile devices, transducer design, loudspeakers, sound insulation materials, room and car acoustics, and ultrasound flow meters.

**FLUID AND HEAT**

**CFD: LAMINAR AND MICROFLUIDIC FLOW, AND PARTICLE TRACING**

Thursday October 19, 8:30am

In this minicourse, we will cover the Microfluidics Module, which features custom interfaces for the simulation of microfluidic devices and rarefied gas flows. Single-phase flow capabilities include both Newtonian and non-Newtonian flow. Beyond its single-phase flow capabilities, this module also allows for two-phase flow simulations capturing surface tension forces, capillary forces, and Marangoni effects. Typical applications include: lab-on-a-chip (LOC) devices, digital microfluidics, electrokinetic and magnetokinetic devices, inkjets, and vacuum systems. We will also discuss the Particle Tracing for Fluid Flow interface, with applications such as dielectrophoretic separation, filtration, erosion, and mixing of inertial particles in fluids.

Speaker: Mats Nigam
HEAT TRANSFER: CONDUCTION AND CONVECTION
Wednesday October 18, 9:00 AM
Speaker: Nicolas Huc
In this minicourse, you will learn about modeling conductive and convective heat transfer with COMSOL Multiphysics®, the Heat Transfer Module, CFD Module, and Subsurface Flow Module. Conductive heat transfer modeling addresses heat transfer through solids and can include heat transfer in thin layers, contact thermal resistance, and phase change. Convective heat transfer addresses heat transfer in solids and fluids. We will address natural convection induced by buoyancy forces.

HEAT TRANSFER: RADIATION AND ENVIRONMENTAL MODELING
Thursday October 19, 8:30 AM
Speaker: Nicolas Huc
Radiative heat transfer is one of the three types of heat transfer and plays a major role in many applications. During this session, we will focus on the features to model surface-to-surface radiation for gray surfaces or for multiple spectral bands, such as for solar and infrared radiation, for example. We will discuss different examples in order to help identify cases where thermal radiation has to be accounted for.

Defining ambient conditions is a key point in the model definition, especially when solar radiation is accounted for, but there are also other cases. We will review the different means to define the ambient condition and how use them for conduction, convection, and radiation in the heat transfer models.

HEAT TRANSFER: WITH PHASE CHANGE
Friday October 20, 9:00 AM
Speaker: Nicolas Huc
Changes in the temperature of a material can lead to a change in material phase, from solid to liquid to gas. Evaporation and condensation of water is a very common case of phase change. This minicourse will introduce you to moisture transport and the various types of phase change modeling that can be done with COMSOL Multiphysics® and the Heat Transfer Module. We will address the relative merits and trade-offs between these techniques.

FLUID-SOLID INTERACTIONS
Friday October 20, 9:00 AM
Speaker: Tycho van Noorden
COMSOL Multiphysics® can perform truly bidirectional fluid-structure interactions where viscous and pressure forces act on an elastic structure and structural velocity forces act back on the fluid. Attend this minicourse to learn about the ready-made physics interface that is available for this important multiphysics application.

POROUS MEDIA FLOW
Friday October 20, 12:30 PM
Speaker: Mats Nigam
Porous media surrounds us; be it the ground beneath us, paper products, filters, or even biological tissue. In this minicourse, we will explore flow and diffusion in porous media as well as how to treat partially saturated media. We will also cover coupled systems including linked free and porous flows; poroelasticity; and mass convection-diffusion in forced, gravity-fed, and density-driven flows.

HANDS-ON: CFD
Wednesday October 18, 3:00 PM
Speaker: Mats Nigam
This guided hands-on session will walk you through examples from fluid flow and will complement the material covered during the CFD minicourses.

HANDS-ON: HEAT TRANSFER
Wednesday October 18, 1:00 PM
Speaker: Nicolas Huc
This guided hands-on session will walk you through examples from heat transfer and will complement the material covered during the Heat Transfer minicourses.

CHEMICAL REACTION ENGINEERING: CHEMICAL REACTIONS
Wednesday October 18, 9:00 AM
Speaker: Hamid Ghanbari
In this minicourse, you will learn to build system-level reaction kinetics models together with process models that include effects of mass, momentum, and energy transport using the Chemical Reaction Engineering Module. This course will also address topics including surface reactions, diffusion and convection in diluted and concentrated solutions, thermal effects on reaction chemistry, mass and heat transfer in heterogeneous catalysis, and optimization of yield and throughout.

CHEMICAL REACTION ENGINEERING: BATTERY MODELING
Wednesday October 18, 1:00 PM
Speaker: Henrik Ekström
In this minicourse, you will learn to model battery cells with a focus on lithium-ion batteries, including charge transport and electrode reactions, and get an introduction to the corresponding couplings to heat transport for performing thermal simulations. We will address how to simulate various transient phenomena such as constant current-constant voltage (CCCV) charge/discharge cycling, electrochemical impedance spectroscopy (EIS), and capacity fade.

HANDS-ON: CHEMICAL ENGINEERING
Thursday October 19, 4:30 PM
Speaker: Hamid Ghanbari
This guided hands-on session will walk you through examples from chemical engineering and will complement the material covered during the Chemical Engineering minicourses.

INTERFACING
LIVELINK™ for MATLAB®
Wednesday October 18, 1:00 PM
Speaker: Magnus Björkman
This minicourse will focus on how to interface the MATLAB® and COMSOL Multiphysics® software. Learn how to use MATLAB® as a scripting interface to implement and solve your COMSOL Multiphysics® simulation, export or import your data at the MATLAB® command prompt, and define model properties such as boundary conditions or material definitions within an m-function.
SPONSORED WORKSHOPS

SIMPLEWARE - FROM 3D IMAGE TO MESH

Wednesday October 18, 1:00pm
By: Simpleware

This minicourse demonstrates the ease of obtaining high-quality meshes from 3D images for use in the COMSOL Multiphysics® software. The workflow of processing volume image data (e.g., from MRI, CT, Micro-CT, and FIB-SEM) to create meshes for life sciences, materials, and industrial applications will be outlined and demonstrated. Learn how the robust and automated meshing algorithms can convert multiple segmented regions into multipart, watertight and analysis-ready models in minutes. Also, see the latest image visualization, segmentation, and meshing tools from recent and upcoming releases.

Simpleware Software Solutions
3D Image Visualization, Analysis and Model Generation

Attend the Simpleware Minicourse
Simpleware - from 3D Image to Mesh
Date: Wednesday, October 18, 2017
Time: 1:00 - 2:30 PM

www.simpleware.com     |     simpleware@synopsys.com     |
### Electromagnetics 1

#### Diamond Room

**Session Chair:** Bjorn Sjödin, COMSOL

1. **Time-Dependent Study of Pressure Waves Generated by Square Array MEMS Ultrasound Transducers**  
   M. A. G. Suijlen \(^1\), R. J. Wolter \(^1\)  
   \(^1\) Novoscan, Nijmegen, Netherlands

2. **A Multi-Physics Study of the Wave Propagation Problem in Open Cell Polyurethane Foams**  
   M. Dossi \(^1\), M. Brennan \(^1\), M. Moesen \(^1\)  
   \(^1\) Huntsman Polyurethanes, Everberg, Belgium

3. **Damping in Dense Gas Acoustic Structure Interaction**  
   J. P. M. Smedders \(^1\), H. P. Pereboom \(^1\), N. González Diez \(^1\)  
   \(^1\) TNO, Delft, The Netherlands

4. **Finite Element Method based Investigation of IPMSM Losses**  
   M. Schmidtner \(^1\), C. Markgraf \(^1\), A. Frey \(^1\)  
   \(^1\) University of Applied Sciences, Augsburg, Bavaria, Germany

5. **EMC Simulation Using Source Reconstruction**  
   A. Bergqvist \(^1\), P. Jacobsson \(^1\)  
   \(^1\) Volvo Cars, Gothenburg, Sweden

6. **Analysis of Electromagnetic Behavior of Permanent Magnetized Electrical Machines in Fault Modes**  
   M. U. Hassan \(^1\), R. Nilssen \(^1\), A. Rakke \(^2\)  
   \(^1\) Department of Electrical Power Engineering, NTNU, Trondheim, Norway  
   \(^2\) Rolls Royce Marine AS, Trondheim, Norway

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### BioScience and BioEngineering

#### Leeuwen Room

**Session Chair:** Ismael Rattalino, Sorin Group Italia s.r.l.

1. **Simulating Organogenesis in COMSOL Multiphysics\(^5\): Tissue Mechanics during Organ Growth**  
   M. Peters \(^1\), D. Iber \(^1\)  
   \(^1\) D-BISSE, ETH, Zurich, Switzerland

2. **Simulating Organogenesis in COMSOL Multiphysics\(^5\): Comparison of Methods for Simulating Branching Morphogenesis**  
   L. D. Wittwer \(^1\), M. Peters \(^1\), S. Aland \(^2\), D. Iber \(^1\)  
   \(^1\) ETH Zürich, Zurich, Switzerland  
   \(^2\) University of Applied Sciences, Dresden, Germany

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### Batteries, Fuel Cells, and Electrochemical Processes

#### Van Walsum Room

**Session Chair:** Markus Ganser, Robert Bosch GmbH

1. **Evaluation of Design Options for Tubular Redox Flow Batteries**  
   T. Struckmann \(^1\), M. William Nix \(^1\), S. Ressel \(^1\)  
   \(^1\) Hamburg University of Applied Sciences, Department of Mechanical Engineering and Production Management, Hamburg, Germany

2. **2-D Modeling of CO2 Electrolysis Using Gas Diffusion Electrode Operate at Neutral pH and Mild Conditions**  
   A. Montevedere Videla \(^1\), N. Vasile \(^1\), G. Saracco \(^1\)  
   \(^1\) Istituto Italiano di Tecnologia, Centre for Sustainable Future Technologies, Turin, Italy

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### Chemical Reaction Engineering

#### Goudriaan Room

**Session Chair:** Dmitry Lazarev, COMSOL

1. **A Flow and Transport Model for Low-Temperature Gaseous Nitrocarburizing of Stainless Steels**  
   J. Feng \(^1\), M. Wettlauffer \(^1\)  
   \(^1\) Centre of Materials Engineering, Heilbronn University, Heilbronn, Germany

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### Acoustics and Vibrations 1

#### Penn Room

**Session Chair:** Marten Nijhof, TNO

1. **Approximation of the Flow Field in Electrochemical Machining Incorporating Pressure Drop Calculation**  
   R. Paul \(^1\), M. Zinecker \(^1\), M. Hackert-Oeschätzchen \(^1\), A. Schubert \(^1\)  
   \(^1\) Professorship Micromanufacturing Technology, Chemnitz University of Technology, Chemnitz, Germany

2. **Multiscale Model of the PECM with Oscillating Cathode for External Geometries Using a Virtual Switch**  
   I. Schaarschmidt \(^1\), M. Zinecker \(^1\), M. Hackert-Oeschätzchen \(^1\), A. Schubert \(^1\), G. Meichner \(^2\)  
   \(^1\) Professorship Micromanufacturing Technology, Chemnitz University of Technology, Chemnitz, Germany  
   \(^2\) Fraunhofer Institute for Machine Tools and Forming Technology, Chemnitz, Germany

3. **Copper Electrochemical Polishing Optimisation**  
   A. Pérez Rodríguez \(^1\), L. Marques Antunes Ferreira \(^1\)  
   \(^1\) CERN, Geneva, Switzerland

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### 3D Acoustic-Structure Interaction of Ultrasonics in Fluids for the Manufacture of Graded Materials

**Authors:** J. Holt \(^1\), C. Torres-Sanchez \(^1\), P. Conway \(^1\), M. G. García-Romero \(^1\)  

1. The Wolfson School of Mechanical, Electrical and Manufacturing Engineering, Loughborough University, Leicestershire, UK

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### Considerations regarding the Design of a Power Ultrasonic Transducer with a Flat Rectangular Plate

**Authors:** R. R. Andrés \(^1\), E. Riera \(^1\)  

1. Grupo de Sistemas y Tecnologías Ultrasound, IITEF, CSIC, Madrid, España

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### Dynamic Simulation of a Coaxial Magnetic Gear Using Global ODE’s and the Rotating Machinery, Magnetic Interface

**Authors:** O. Ostroushko \(^1\), W. Zhang \(^1\), W. M. Rucker \(^1\)  

1. Institute of Theory of Electrical Engineering, University of Stuttgart, Stuttgart, Germany

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### Analysis of Electromagnetic Behavior of Permanent Magnetized Electrical Machines in Fault Modes

**Authors:** M. U. Hassan \(^1\), R. Nilssen \(^1\), A. Rakke \(^2\)  

1. Department of Electrical Power Engineering, NTNU, Trondheim, Norway  
   \(^2\) Rolls Royce Marine AS, Trondheim, Norway
THURSDAY 1:00PM-2:30PM

These user presentations happen simultaneously, choose the ones that most interest you!

**GEOPHYSICS AND GEOMECHANICS**

J. F. STAAL ROOM
SESSION CHAIR: Robbie Balcombe, COMSOL

- 3D Modeling of the In-Situ Stress Field in Nordland, Northern Norway
  S. Gradmann 1, Y. Maystreñiko 1, M. Keiding 1, O. Olesen 1
  1 Geological Survey of Norway, Trondheim, Norway

- A 3D Multiphase Flow Model of Hydrogen Storage in Geological Formations
  E. Abarca 1, A. Sainz-Garcia 1, F. Granía 1
  1 Amphos 21 Consulting S.L., Barcelona, Spain

- Simulation of the Transport Phenomena in the Horstberg Geothermal System
  A. Hassanzadegan 1, T. Tischer 1
  1 Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany

- Exergy Analysis of Polymer Flooding in Clastic Reservoirs
  A. Hassan 1, H.Bruining 1, T. Mua 1, R. Farajzadeh 2
  1 Delft University of Technology, Delft, The Netherlands, and Sudan University of Science and Technology, Khartoum, Sudan
  2 Delft University of Technology, Delft, The Netherlands

- Analytical Solution for the Steady Poroelastic State under Influence of Gravity
  E. Holzbecher 1
  1 German University of Technology in Oman, Muscat, Oman

- Heat Transfer Modeling for Thermal Stimulation of Near Wellbore Using COMSOL Multiphysics
  M. Mohammed 1
  1 Freiberg University of Mining and Technology, Sachsen, Germany

- Forward and Inverse Problems in Multifield Modeling of Technology, Industry, and Society
  A. Hassanzade 1, R. Farajzadeh 1
  1 Delft University of Technology, Delft, The Netherlands

- Optimization of an Explosive Mixture Cooling Process Including a Phase Change
  J. D. Wheeler 1, P. Namy 1, C. Croux 1, E. Benade 2
  1 SIMTEC, Grenoble, France
  2 TDA Armements, LA-FERTE-SAINT-AUBIN, France

- Natural Convection Effects on the Solidification in Cylinders at Different Filling Percentages
  R. Boursi 1, A. Alshayjli 1
  1 Kuwait University, Kuwait City, Kuwait

- Simulation of Dynamic Thermal Fields Assisting DMLS Additive Manufacturing of Biocompatible Ti-Alloy
  E. Lacatus 1, G. C. Alcuc 2, M. Sopronyi 2
  1 Polytechnic University of Bucharest, Bucharest, Romania
  2 Groupe Renault, Bucharest, Romania

- Design Criteria of the Passive Joints in Underactuated Modular Soft Hands
  M. Malvezzi 1, G. Salvetti 1, L. Hussain 2
  1 University of Siena, Siena, Italy; Istituto Italiano di Tecnologia, Genova, Italy
  2 University of Siena, Siena, Italy

- Multiphysics Simulations for the Design of a Superconducting Magnet for Proton Therapy
  C. Calzolaio 1, H. Carolin 1, S. Stephane 1
  1 Polytechnic University of Bucharest, Bucharest, Romania
  2 Paul Scherrer Institut, Villigen, Switzerland

- Natural Convection Effects on the Liquid Solidification in DMLS Additive Manufacturing of Biocompatible Ti-Alloy
  E. Abarca 1, A. Sainz-Garcia 1, F. Granía 1
  1 Amphos 21 Consulting S.L., Barcelona, Spain

- Simulation of Compaction in Asphaltic Mixtures, Part I: Gyratory Compactor
  A. Alipour 1, S. D. Mookhoek 1
  1 Department of Structural Reliability, TNO, Delft, The Netherlands

- Phase Transformation and Deformation Model for Quenching Simulations
  Y. Kaymak 1
  1 VDEh Betriebsforschungsinstitut GmbH, Düsseldorf, Germany

- Principle of Multi-objective Optimization in Additive Manufacturing
  J. Stuhrmann 1, A. Kröger 1
  1 University of Stuttgart, Stuttgart, Germany

- Parameters Tuning in Laser Beam Welding with an Equivalent Heat Source
  A. Artinov 1, M. Bachmann 1, M. Rethmeier 1
  1 BAM Federal Institute for Material Research and Testing, Berlin, Germany
**THURSDAY 2:45PM-4:15PM**

**ELECTROMAGNETICS 2**

**DIAMOND ROOM**

**SESSION CHAIR:** Guoyan Sun, Brugg Kabel AG

- Predicting the Parasitic Forces in the Magnetically Levitated Adaptive Optics Mirrors
  - C. Del Vecchio 1, R. Briguglio 1, A. Riccardi 1, M. Xompero 1
  - 1 National Institute for Astrophysics, Arcetri Astrophysical Observatory, Florence, Italy

- Green's Function Approach to Efficient 3D Electrostatics of Multi-Scale Problems
  - C. Roman 1, L. Schmid 1, L. Stolpmann 1, C. Hierold 1
  - 1 ETH, Zurich, Switzerland

- Impact of the Forces due to CLIQ Discharges on the New HL-LHC Beam Screen
  - M. Morrone 1, C. Garzon 1
  - 1 CERN, Geneva, Switzerland

- A Multiphysics Model to Ensure Power Cables are Restrained Safely During Short Circuit Fault
  - M. S. Yeoman 1, R. J. Varley 1, R. Damodharan 1
  - 1 University of Pisa, Pisa, Italy
  - 1 Information Technologies Institute, Centre of Western Macedonia, Kozani, Greece

- Nonlinear Shielded Multipair Twisted Railway Cable Modeling with COMSOL Multiphysics®
  - Y. Jin 1, G. Papaiz Garbini 1, S. Karoui 1, M. Cucchiara 1
  - 1 University of Florence, Florence, Italy
  - 1 University of Antwerp, Belgium

- Virtual Long Term Testing of High-Power Fiber Lasers
  - I. Schüttler 1, B. Neumann 1, S. Belke 1, F. Becker 1, S. Ruppik 1
  - 1 Coherent | ROFIN, Hamburg, Germany

**OPTICS, PHOTONICS, RF AND MICROWAVE ENGINEERING**

**WALSUM ROOM**

**SESSION CHAIR:** Johan Slot, Royal DSM/Eindhoven University of Technology

- Frequency Response of Soil-structure Interaction for Concrete Gravity Dams
  - A. De Falco 1, M. Mori 1, G. Sevieri 2
  - 1 University of Pisa, Pisa, Italy
  - 2 University of Florence, Florence, Italy

- COMSOL Multiphysics® Simulations to Study Nonlocal Properties of a Au Nanoshell Using Quantum Hydrodynamic Theory
  - M. Khalid 1, C. Ciraci 1
  - 1 Center for Nanomaterials Nanotechnologies, Istituto Italiano di Tecnologia, Arnesano, Italy

- Evaluating Nanogaps in Ag and Au Nanoparticle Clusters for SERS Applications Using COMSOL Multiphysics®
  - R. Asapu 1, R. Ciocclan 1, N. Clae 1, N. Blommaerts 1, S. Bals 1, P. Cool 1, S. Denys 1, S. Lenaerts 1, S. Verbruggen 1
  - 1 Department of Bioscience Engineering, DuEL Research Group, University of Antwerp, Belgium
  - 2 Department of Surface Engineering, PLASMANT Research Group, University of Antwerp, Belgium
  - 3 Department of Physics, EMAT Research Group, University of Antwerp, Belgium

- Modelling Microwave Scattering from Rough Sea Ice Surfaces
  - X. Xu 1, A. P. Doolger 1, F. Melandsø 1, C. Brekke 1
  - 1 Department of Physics and Technology, UiT The Arctic University of Norway, Tromsø, Norway

- Tunable Metamaterial-Inspired Resonators for Optimal Wireless Power Transfer Schemes
  - A. X. Lalas 1, N. V. Kantartzis 2, T. T. Zygiaris 3, T. P. Theodoulidis 4
  - 1 Information Technologies Institute, Centre of Research & Technology - Hellas, 6th km Harilaou - Thessaloniki, Greece
  - 2 Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece
  - 3 Department of Informatics and Telecommunications Engineering, University of Western Macedonia, Kozani, Greece
  - 4 Department of Mechanical Engineering, University of Western Macedonia, Kozani, Greece

**CHEMICAL ENGINEERING AND MICROFLUIDICS**

**GOUDRIAAN ROOM**

**SESSION CHAIR:** Mats Nigam, COMSOL

- Reactive Transport Modeling of CO2 in Carbonate Rocks: Single Pore Model
  - P. Agrawal 1, J. Koskamp 1, A. Raad 1, M. Wolthers 1
  - 1 Utrecht University, Utrecht, The Netherlands

- On the Modeling and Simulation of Electroosmotic Micropump for Biomedical Applications
  - M. Badran 1
  - 1 Future University in Egypt, Cairo, Egypt

- Non-linear DC Electrophoresis in High Electric Field Conditions
  - E. Ruiz-Reina 1, F. Carrique 1
  - 1 University of Málaga, Málaga, Spain

- Modeling and Simulation of Hydrogen Generation in Membrane Reactor via Steam Octane Reforming
  - N. Ghasem 1, A. Y. Alraeesi 1
  - 1 UAE University, Alain, United Arab Emirates

- Sensitivity Analysis of CPP’s for Solvent Removal Process of a API-Protein Bonded Nano-Suspension
  - C. C. Huang 1, T. Liu 1, F. Faassen 1
  - 1 Teva Pharmacemie B.V., Haarlem, The Netherlands

**ACOUSTICS AND VIBRATIONS 2**

**PENN ROOM**

**SESSION CHAIR:** Jan-Jaap Koning, TU Eindhoven

- Topology Optimization of Thermoviscous Acoustics in Tubes and Slits with Hearing Aid Applications
  - R. Christensen 1
  - 1 GN ReSound A/S, Ballerup, Copenhagen, Denmark

- Effective Properties of Viscoelastic Composite with Piezoelectric Fibers
  - M. Al-Ajmi 1, P. Muthusamy 1
  - 1 Mechanical Engineering Department, Kuwait University, Kuwait

- Topology Optimization of a Gaseous Photoacoustic Spectroscopy Cell Using COMSOL Multiphysics®
  - R. Haouari 1, Y. Rechou 1, L. Lajer 1, X. Rottenberg 1
  - 1 Imec & IU Leuven, Leuven, Belgium
  - 2 Imec, Leuven, Belgium

**COMSOL CONFERENCE 2017**
Simulation of Slag/Gas and Slag/Iron Interface Tilting in Blast Furnace Hearth During Slag Tapping
Y. Kaymak 1, T. Hauck 1, R. Lin 1, H. Rausch 1
1VDEN Betriebsforschungsinstitute GmbH, Düsseldorf, Germany
2AG der Dillinger Hüttenwerke, Dillingen, Germany

Simulation of Slag/Gas and Slag/Iron Interface Tilting in Blast Furnace Hearth During Slag Tapping
Y. Kaymak 1, T. Hauck 1, R. Lin 1, H. Rausch 1
1VDEN Betriebsforschungsinstitute GmbH, Düsseldorf, Germany
2AG der Dillinger Hüttenwerke, Dillingen, Germany

These user presentations happen simultaneously, choose the ones that most interest you!

COMSOL APPLICATIONS AND SIMULATION METHODS
VAN DER VEEKEN ROOM
SESSION CHAIR:
Frank de Pont, COMSOL

Level-Set based Topology Optimisation of Convectively Cooled Heatsinks
M. S. Santhanakrishnan 1, T. Tiflod 1, C. Bailey 1
1The University of Greenwich, London, United Kingdom

Using COMSOL Multiphysics® for Theoretical and Experimental Validation of Critical Properties of Composite Process
A. Häberle 1, P. Fideu 2, A. Herrmann 1
1CTC GmbH, Stade, Lower Saxony, Germany
2Airbus Operations GmbH, Hamburg, Hamburg, Germany

Some Benchmark Simulations for Flash Flood Modeling
E. Holzbecher 1, H. Hadidi 1
1German University of Technology in Oman, Muscat, Oman

Extended Physics Modeling of the Resin Flow During Vacuum Infusion Processes
J. Stolz 1, P. Fideu 2, A. Herrmann 1
1Faserinstitut Bremen e.V., Bremen, Germany
2Airbus Operations GmbH, Hamburg, Hamburg, Germany

A Plasma Torch Model
B. Chine 1
1Costa Rica Institute of Technology, School of Materials Science and Engineering, Cartago, Costa Rica

Simulation and Visualisation of Shielding Gas Flows During Wire-Arc Additive Manufacture
I. Bitharas 1, A. Moore 1
1Heriot-Watt University, Edinburgh, UK

Simulation of an Impulse Arc Discharge in Line Lightning Protection Devices
A. Chusov 1, E. Rodikova 1, D. Belko 1
1Institute of Biomass and Resource Efficiency, University of Applied Sciences and Arts Northwestern Switzerland, Windisch, Switzerland

Three-Dimensional Numerical Simulation of Arc Motion Between Bus-Bar Electrodes
M. Lisnyak 1, M. Chnani 2, A. Gautier 1, J.-M. Bauchere 1
1Université d’Orléans, Orléans, France
2Zodiac Aero Electric, Zodiac Aerospace, Montreuil, France

Electron Trajectories in Scanning Field-Emission Microscopy
H. Cabrera 1
1Swiss Federal Institute of Technology, Zurich, Switzerland

Thermal Modeling for On-Interposer Thermoelectric Sensors
C. Morel 1, G. Savelli 1
1CEA, Grenoble, France

Getting State-Space Models from FEM Simulations
A. W. M. van Schijndel 1
1Eindhoven University of Technology, Eindhoven, The Netherlands

How Apps Can Support COMSOL Multiphysics® Users?
G. Petrone 1, C. Barbagallo 1
1BE CAE & Test, Catania, Italy

A Standalone Interface for Web-Based Virtual Reality of Calculated Fields
M. Jütter 1, N. Zhao 1, S. Grabmaier 1
1University of Stuttgart, Institute for Theory of Electrical Engineering, Stuttgart, Germany

Simulation Methods on Virtual Laboratories for Characterization of Functionalized Nanostructures
E. Lacatus 1, G. C. Alecu 2, A. Tudor 2, M. Sopronyi 1
1Polytechnic University of Bucharest, Bucharest, Romania
2Group Renault, Bucharest, Romania
3STAA STORAGE, Bucharest, Romania
4National Institute for Laser, Plasma and Radiation Physics, Magurele, Romania
5Polytechnic University of Bucharest, Bucharest, Romania

Getting State-Space Models from FEM Simulations
A. W. M. van Schijndel 1
1Eindhoven University of Technology, Eindhoven, The Netherlands

How Apps Can Support COMSOL Multiphysics® Users?
G. Petrone 1, C. Barbagallo 1
1BE CAE & Test, Catania, Italy

A Standalone Interface for Web-Based Virtual Reality of Calculated Fields
M. Jütter 1, N. Zhao 1, S. Grabmaier 1
1University of Stuttgart, Institute for Theory of Electrical Engineering, Stuttgart, Germany

Simulation Methods on Virtual Laboratories for Characterization of Functionalized Nanostructures
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2Group Renault, Bucharest, Romania
3STAA STORAGE, Bucharest, Romania
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Thermal Modeling for On-Interposer Thermoelectric Sensors
C. Morel 1, G. Savelli 1
1CEA, Grenoble, France

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Getting State-Space Models from FEM Simulations
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How Apps Can Support COMSOL Multiphysics® Users?
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New to the conference program this year is the addition of Panel Discussions. These sessions are designed to encourage conversation in an interactive setting while we learn about industry trends, design challenges, and best practices within medical product design and acoustics simulation.

**Heat Transfer Modeling and Simulation**
Thursday, October 19th  
1:00pm – 2:30pm

Heat transfer simulations are widely used in the design of electronic devices, medical implants, engines, and batteries, to name a few. We will discuss the state-of-the-art capabilities in heat transfer simulations, and how effectively they are used in various industries. The industry panelists will share their insights from simulating and designing a wide range of processes and products. A COMSOL panellist will also provide his perspective and answer technical questions related to the use of COMSOL Multiphysics.

**MODERATOR:**  
Jos van Schijndel,  
University of Technology Eindhoven

**PANELLIST:**  
Nicolas Huc  
COMSOL

**PARTICIPANTS:**  
Giuseppe Petrone  
BE CAE & Test  
Patrick Kennes  
Cochlear

**Acoustics Modeling and Simulation**
Thursday, October 19th  
2:45pm – 4:15pm

Acoustics simulations are widely used in the design of sensors and actuators, loudspeakers, noise control devices, and musical instruments, to name a few. We will discuss the state-of-the-art capabilities in acoustic simulations, and how effectively they are used in various industries. The industry panelists will share their insights from designing a wide range of products (loudspeakers, acoustic transducers, MEMS devices, and lab-on-a-chip devices). A COMSOL panelist will also provide his perspective and answer technical questions related to the use of COMSOL Multiphysics.

**MODERATOR:**  
Marten Nijhof  
TNO

**PANELLIST:**  
Bjorn Sodin  
COMSOL

**PARTICIPANTS:**  
Giuseppe Petrone  
BE CAE & Test  
Patrick Kennes  
Cochlear  
Nicolas Huc  
COMSOL  
Brett Marmo  
Xi Engineering  
Theo Campmans  
Ipb sight
Effect of KFm Airfoils Application on Aerodynamic Characteristics on the Example of NACA 0012
R. Szczepaniak 1, R. Babel 1
1 Polish Air Force Academy, Aeronautics Faculty, Deblin, Poland

Interaction of Microparticles in a Miniaturized Vacuum-Cleaner
I. S. M. Jimidar 1, Y. Vanderheyden 1, H. Gardeniers 1, G. Desmet 1
1 Vrije Universiteit Brussel, Department of Chemical Engineering, Brussels, Belgium

Modeling and Simulation of Redox Titration of Metal OXides at Porous Microelectrodes
L. Balboa 1, M. Hänsch 1, J. Brehmken 1, G. Wittstock 1
1 Institute of Chemistry, Carl von Ossietzky University of Oldenburg, Oldenburg, Germany

Study of a Loudspeaker in a Vehicle Door
M. K. Bogdanski 1, F. Malbos 2, M. Strauss 1
1 Harman Becker Automotive Systems, VPDT, Straubing, Germany
2 Harman France, VPDT, Paris, France

ICP Apps to Readily Solve Reactive Transport Simulations in COMSOL Multiphysics®
D. Negro 1, A. Saiz-Garcia 1, D. Sampietro 1, E. Coene 1, E. Abara 1, A. Idiart 1, M. Lavina 1, G. Silva 1, J. Molinero 1
1 Analysis of Asphalt Solar Collectors Using a Finite Element Approach
G. Guldenhops 1, C. Vuye 1, S. Aricinilli 2
1 Department of Civil Engineering, Worcester Polytechnic

CFD Simulations to Improve Protein Separation Introducing a Permeable Surface with Periodic Grooves
M. Marioli 1, W. Th. Kok 1
1 Analytical Chemistry Group, van’t Hoff Institute for Molecular Sciences, University of Amsterdam, The Netherlands

A Multiphysical Approach of a Sterilization System for Aseptic Food Processing
Z. B. Jilideh 1, P. Kirchner 1, T. Rydlewski 1, C. Hollenbeck 1, T. Wagner 1, R. H. Wagner 1, M. J. Schöne 1
1 Imagine Engineering GmbH, Berghem, Germany
2 Institute of Nano- and Biotechnologies (INB), FH Aachen, Jülich, Germany
3 Soft Matter and Biophysics, Catholic University, Leuven, Belgium

Iron Ore Sintering Process Model to Study Local Permeability Control
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2 Shuanglang Clyde Bergemann GmbH, Ratingen, Germany

Phase Transformation and Deformation Model for Quenching Simulations
Y. Kaymak 1
1 VDEh Betriebsforschungsinstitute GmbH, Düsseldorf, Germany

Numerical Calculation of the Three Dimensional Inter-Bar Current Distribution in Induction Machines
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2 Technical University of Ilmenau, Ilmenau, Germany

Simulation of Eddy Current Non Destructive Testing using COMSOL Multiphysics®
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COMSOL® Analysis for Duct Acoustic
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Multiphysical Simulation of an Induction Sealing Process for Cups with Laminated Aluminum Foil
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Multiphysical Simulation of Moved Data Cable
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1 Friedrich-Alexander Universität, Erlangen, BY, Germany

Coupled Optical & Thermal Model of a Silicon Microprobe
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2 Department of Physics, University of Szeged, Szeged, Hungary

CMOS Based Atom Chips for Sensor Applications
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2 Department of Micro- and Nanosystems, University of Applied Sciences Wiener Neustadt, Austria, and School of Physics and Astronomy, University of Nottingham, Nottingham, UK

Near-Field of Resonating Piezoelectric Membrane Used as Ultrasound Transducer
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CFD Investigation of Cross Bubbly Flow through a Bubble Column with Rectangular Geometry
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1 The University of Hull, Hull, East Yorkshire, United Kingdom

Oxygen Based Diffusion Modeling of Oxidation Behaviour of Encapsulated Lipids
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Numerical Simulation of PCB-Coil-Layouts for Inductive Energy Transfer Systems
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Modeling of the Clamping Fixture of a Piezoelectric Cantilever-type Energy Harvesting Device
T. Hoang 1,2, G. Poulin-Vitrant 2, G. Ferin 1, J. Levassort 2, C. Bantignies 1, A. Nguyen-Dinh 1, M. Bavencoffe 2
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2 GREMAN UMR 7347, Université de Tours, CNRS, INSA Centre Val de Loire, Blois, France

A Novel Free-standing Evanescent Waveguide for Sensing
X. Meng 1, Y. Xin 1, P. French 1
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Simulation of Slag/Gas and Slag/Iron Interface Tilting in Blast Furnace Hearth During Slag Tapping
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1 VDEh Betriebsforschungsinstitute GmbH, Düsseldorf, Germany
2 AG der Dillinger Hüttenwerke, Dillingen, Germany

Coupled Heat, Moisture and CFD Modeling in the Built Environment
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Biologic Tissues Properties Deduction Using an Opto-Mechanical Model of the Human Eye
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1 R&D, Kejako, Plan-les-ouates, GE, Switzerland
2 MNCH, HES-SO, GE, Switzerland
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<td>D. Cocco 1, LJC Energy UK, Bristol, UK</td>
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- A. Chusov 1, E. Rodikova 2, D. Belko 1
- Streamer Electric Inc., Saint Petersburg, Russia
- Streamer Electric Inc. and Saint Petersburg State University, St. Petersburg, Russia

**Simulation of Dynamic Thermal Fields Assisting DMLS Additive Manufacturing of Biocompatible Ti-Alloy**

- E. Lacatus 1, G. C. Alecu 1, M. Sopronyi 2
- Polytechnic University of Bucharest, Bucharest, Romania

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- R. Paul 1, M. Zinecker 1, M. Hackert-Oschätzchen 1, A. Schubert 1
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**Copper Electrochemical Polishing Optimisation**

- A. Pérez Rodriguez 1, L. Marques Antunes Ferreira 1
- CERN, Geneva, Switzerland

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- M. S. Yeoman 1, R. J. Varley 1, R. Damodharan 1, L. Fritzell 2
- Continuum Blue Ltd., Cardiff, United Kingdom
- CMP Products Ltd., Cramlington, United Kingdom

**Hydrothermal Carbonization: A Renewable Alternative to Fossil Fuels and Respective Evaluation**

- P. Kladios 1, A. Stegou 1, Z. Sapia 1
- National Technical University of Athens, Athens, Greece

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- A. Mallo Carpio 1, M. Cortes Carmona 1
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V. Barati 1, H. Reith 1, G. Li 1, D. A. Lara Ramos 1, G. Schierning 1, K. Nielsch 1
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Comparison of Pipe Flow vs. CFD Module for Homogeneous Liquid Delivery to a Tank in a Cooling Reactor
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Modeling of Epithelial Sheet Deformation Under External Force Applied by a Migrating Cell
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V. Tishkova 1, R. Grossier 1, S. Veesler 1
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Modeling of Electro-Thermal Microbolometer for Thermal Imaging
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Evaluating Nanogaps in Ag and Au Nanoparticle Clusters for SERS Applications Using COMSOL Multiphysics®
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Gas Permeation Through the Polymeric Membrane – Fluid Behavior in the Permeate Channel
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Exergy Analysis of Polymer Flooding in Clastic Reservoirs
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Computational Fluid Dynamics Approach to Evaluate Electrostatic Precipitator Performance
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COMSOL® Simulation of Blister Actuated Laser Induced Forward Transfer (Ba-LIFT)
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Stress Analysis of Buried Pipes using COMSOL Multiphysics® Software
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Designing and Implementation of a 4000/5A Current Transformer
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J. Hernandez-Wong 1, J. B. Rojas 1, J. A. Calderon Aneas 1, E. Marin Moares 1, S. Suarez Quezada 1, O. Olivo Arias 2
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Comparing Between COMSOL Multiphysics® and Star-CCM® Simulation Results and Experimentally Determined Measured Data for a Venturi Tube
E. Weise 1, A. Diring 1, L. Fromme 1, M. Petry 1
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Field Evaluation of Photovoltaic-Powered Solar Domestic Water Heating in Rural Contexts
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Uncertainty Assessment and Sensitivity Analysis of Heat Generation within a Lithium-Ion Battery
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M. Ahmadi 1
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Effects of Geometry and Operating Conditions on Membrane Reactor for Water Gas Shift Reaction
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Modeling Fluid-Structure Interaction in a Pressure-Controlled Current-Limiting Valve
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CFD Modeling of a Mixture Device for Medical Applications
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Simulation of Phononic Cavity Coupling in Nanobeam Based Structures Using COMSOL Multiphysics®
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Optimal Bang-Bang Control in Coupled Dynamical Systems
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Fatigue Analysis of an Aluminum Tricycle Frame
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N. Rezaii 1, R. Chuman 1, J.-Ph. Mai 1
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Polynomial-Chaos Uncertainty Modeling in Eddy-Current Inspection of Cracks
T. T. Zygiäridis 1, A. E. Kyrigazoglou 1, T. P. Theoðoulidis 2
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A Fluid Particle Simulation to Study the Motion Sickness in Semicircular Canal
C. Park 1, J. Lee 1
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3D-model of an AC/DC Hybrid EHV Transmission Line to Analyze the Electrical Field along Insulators
D. Potkrajc 1, S. Papenheim 1, M. Kizilcay 1
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Keep it Simple and Learn More - On a Stationary Study of a Time-Dependent Problem
B. Baumann 1, J. Schwieger 1, J. Stein 1, M. Wolff 1
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Computational Modeling of Electrode with Saline Irrigation for Radiofrequency Cardiac Ablation
J. H. Moon 1, J. W. Ahn 1, J. Y. Kim 1, S. A. Lee 1, H. C. Jung 1, S. H. Lee 1
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3D Simulation of an Ethanol Reformer
A. Cifuentes 1, J. Llorca 1, R. Torres 1, S. Rosell 1, J. Grau 1
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Design and Optimization of Power Cable Accessories Using COMSOL Multiphysics®
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2 Electrical Engineering Department, Delft University of Technology, Delft, Netherlands

Simulation of the Additive Process of Forming 3D Products from HSLA Steel 09G2S
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Simulation of Auxin Accumulation and Transport in a Plant Root
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Transient Vacuum and High Pressure Generation by Focused Acoustic Waves
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CFD Investigation of a Photocatalytic Multi-Tube Reactor for Indoor Air Purification
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Simulation of the Additive Process of Forming 3D Products from HSLA Steel 09G2S
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Catalysis and Transport in a Plant Root
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Analysis of Mixing Chambers for the Processing of Two-Component Adhesives for Transport Applications
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Separation of Circulating Tumor Cells Using Insulating Based Dielectrophoresis
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Lithosphere-Scale 3D Thermal Models of the Norwegian Continental Shelf
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