COMSOL 5.3a Expands Its Range of Innovative Multiphysics Modeling Tools
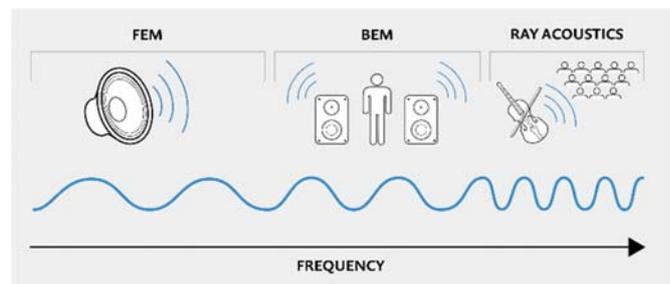
COMSOL Multiphysics® and COMSOL Server™ version 5.3a bring unprecedented modeling power to users by integrating new numerical methods for multiphysics modeling and app development.

BURLINGTON, MA (December 14, 2017) — COMSOL, the leading provider of software solutions for multiphysics modeling and simulation, today made available the latest release of the COMSOL Multiphysics® and COMSOL Server™ products. Version 5.3a provides simulation specialists with cutting-edge modeling tools and increased solver performance. From shape memory alloy (SMA) material models to a revolutionary method for capacitively coupled plasma (CCP) simulations and a hybrid boundary element-finite element (BEM-FEM) method for acoustics and acoustic-structure interaction, customers across all industries and physics areas will benefit from new methods and reduced solution times.
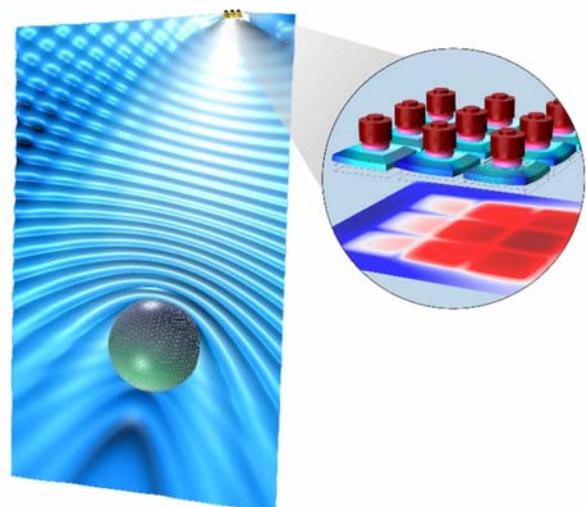
"Our customers strive for a highly efficient product development cycle. With the multiphysics modeling capabilities of our software, they can create innovative products faster and at a lower cost than ever before. This exciting release is a result of a big focus on quality and major advances in new powerful modeling methods, increased speed, and user-driven enhancements," says Svante Littmarck, President and CEO, COMSOL, Inc.
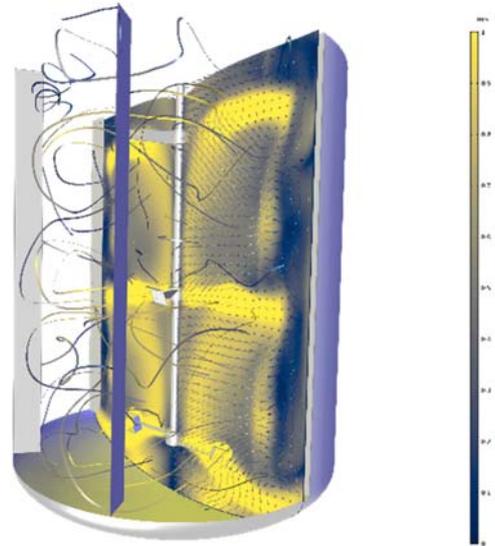

By combining boundary element, finite element, and ray acoustics analysis in a multiphysics environment, COMSOL 5.3a delivers unprecedented acoustic modeling capabilities.

Hybrid Boundary Element-Finite Element Method for Acoustics

COMSOL 5.3a offers acoustics analysis based on the boundary element method. "The recent addition of the boundary element method in COMSOL Multiphysics will enable us to model large acoustical radiation problems, such as, exterior sound reproduction for electric cars" comments Martin Olsen, Principal Engineer, Research, at Harman Lifestyle Audio. "We are pleased with the full range of methods available in COMSOL, from FEM and BEM, to ray tracing. The possibility of coupling BEM to FEM creates a highly versatile simulation environment for the automotive audio industry." Acoustic engineers will get unprecedented modeling power by being able to analyze the full range of acoustic frequencies from the lowest bass notes to ultrasound, in addition to all of the possible multiphysics couplings available in the software.

Scattering of acoustic waves generated by a piezoelectric tonpilz sonar array. Left: Sound pressure level. Right: Deformation of the array and generated total acoustic pressure field.

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New Modeling Tools, Faster Solvers, Better Visualization

A framework for model reduction is available with the release of two methods, modal analysis and asymptotic waveform evaluation (AWE), for the reduction of the computational complexity of mathematical models. Customers using LiveLink™ *for* MATLAB® can get access to reduced models through a dedicated state-space export function. Many customers, especially those involved with computational fluid dynamics (CFD) analysis, will experience up to 40% improved performance for algebraic multigrid (AMG) and 20% for geometric multigrid (GMG) solvers. Support for 3Dconnexion® SpaceMouse® devices makes model navigation easier. The color table Cividis, optimized for people with color vision deficiency, is now available for visualization of field quantities.

Thermodynamics Properties Library, New Turbulence Model, and Moisture Flow Multiphysics Coupling

Chemical engineers will benefit from the built-in library for thermodynamics properties, which features models for gases, liquids, and phase equilibria (gas-liquids). "The built-in

Visualization of the flow field in a mixer rendered featuring the color table, Cividis, courtesy of Pacific Northwest National Laboratory (PNNL).

thermodynamic and transport properties feature allows for a rapid, accurate, and user-friendly model definition of fluid flow, heat transfer, and reacting flow models. The dramatic increase in usability also includes the use of external thermodynamic property packages that may link through standard formats to COMSOL Multiphysics," comments Ed Fontes, CTO, COMSOL. There is a new realizable k-ε turbulence model available for a more accurate description of fluid flow features. A predefined multiphysics coupling has been introduced for the modeling of heat and moisture transport in building materials and moist air.

Revolutionary Method for Plasma Simulations, BEM for Magnetic Field Analysis

A revolutionary new method for modeling capacitively coupled plasmas (CCP), based on a non-linear time-periodic formulation, reduces solution times of CCP simulations from weeks to hours. Those working in electromagnetics can now use the boundary element method to analyze magnetic fields in models with large volume-to-surface ratio, including infinite domains, with great accuracy.

New Shape Memory Alloy Material Models and 3D Solid-Beam Connections

Engineers designing smart metal devices, from biomedical to consumer products, can now include a shape memory alloy (SMA) material in their simulations. A SMA material can be coupled to other physics such as heat transfer. Users will benefit from a solid-beam connection feature as well as a new technique to model thread forces for bolts using a dedicated type of contact pair boundary condition.

Robust Rendering in Simulation Apps, New Publishing and Administration Features

Apps with very large plots or many graphics windows will see improved rendering performances resulting in a more responsive user interface. COMSOL Server™ users will now have the option to login without a password within their corporate network, making it quicker and easier to run apps. The thumbnail image and description for an app can now be changed directly through the COMSOL Server™ web interface. Administrators can send global notifications to all users, for example, if the server needs to shut down for maintenance. There is a new cluster verification app installed by default in COMSOL Server™ that allows administrators to test cluster settings more conveniently. This app is also available in a regular COMSOL Multiphysics® installation for floating network licenses.

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Availability

COMSOL Multiphysics® and COMSOL Server™ software products are supported on Windows® operating system, Linux® operating system, and macOS operating system. The Application Builder is supported in the Windows® operating system.

To browse version 5.3a release highlights, visit www.comsol.com/release/5.3a.

To download the latest version, visit www.comsol.com/product-download.

About COMSOL

COMSOL is a global provider of simulation software for product design and research to technical enterprises, research labs, and universities. Its COMSOL Multiphysics® product is an integrated software environment for creating physics-based models and simulation apps. A particular strength is its ability to account for coupled or multiphysics phenomena. Add-on products expand the simulation platform for electromagnetics, structural, acoustics, fluid flow, heat transfer, and chemical applications. Interfacing tools enable the integration of COMSOL Multiphysics® simulations with all major technical computing and CAD tools on the CAE market. Simulation experts rely on the COMSOL Server™ product to deploy apps to their design teams, manufacturing departments, test laboratories, and customers throughout the world. Founded in 1986, COMSOL employs more than 450 people in 20 offices worldwide and extends its reach with a network of distributors.

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