

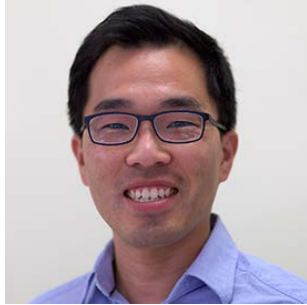
COMSOL Day
Orange County



Thursday
May 17, 2018
8:30AM–4:00PM

Welcome to COMSOL Day!

COMSOL Speakers



Leo Hwang



Mina Sierou



Andy Cai



Ping Chu

Invited Speakers



Humberto Torreblanca

General Atomics

DIII-D National Fusion Facility

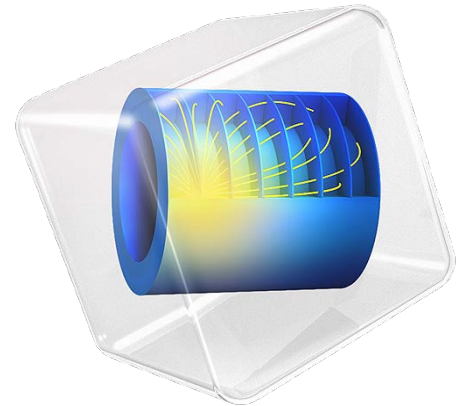


Gopal Mathur

Meta Acoustic Technologies

COMSOL® Trial

- Trial passcode in your folder
 - All products & technical support up until 5/31
- Not required for minicourses
- We have USBs and DVDs if needed



COMSOL Server™

- Demo of COMSOL Server™ (deploying apps)
 - Link: <https://www.comsol.com/server-demo>
 - Username: Bethesda18
 - Password: Bethesda18

COMSOL Day Agenda

Time	Title	Speaker
9:00	Introduction to COMSOL Multiphysics®	Leo
10:00	Invited Speakers	Humberto
	Invited Speakers	Gopal
11:00	Application Builder and COMSOL Server	Andy
11:45	Lunch Break	
1:15	Parallel Minicourse: Microfluidics Chemical Reaction Engineering	Mina
1:15	Parallel Minicourse: Solvers and Meshing	Andy

COMSOL Day Agenda

Time	Title	Speaker
2:15	Parallel Minicourse: Optimization	Andy
2:15	Parallel Minicourse: Low-Frequency Electromagnetics	Ping
3:15	Parallel Minicourse: Acoustics and Piezoelectricity	Ping
3:15	Parallel Minicourse: Bioheating	Leo

COMSOL Days

Join us for a day of *multiphysics simulation and apps*

MINICOURSES | TALKS | USER COMMUNITY

Explore how you can use multiphysics modeling in your designs, devices, and processes. Learn how to spread simulation throughout your organization with apps. Connect with COMSOL® software users and get inspiration from industry experts.

FREE REGISTRATION: comsol.com/comsol-days



BETHESDA, MD
April 5



HOUSTON, TX
April 19



MONTREAL, QC
May 2



DETROIT, MI
May 10



SAN JOSE, CA
May 16



ORANGE COUNTY, CA
May 17



BOSTON, MA
May 31



COLUMBUS, OH
June 21

COMSOL Day

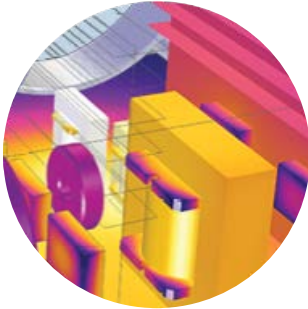
Orange County



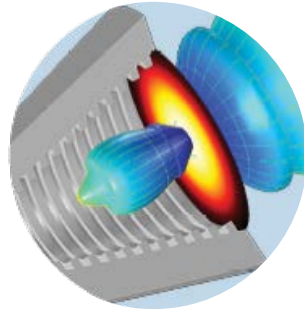
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Introduction to COMSOL Multiphysics®

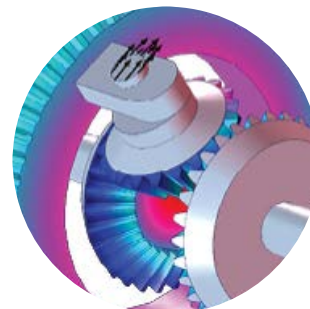
Engineering Design Involves Multiple Physics



Heat



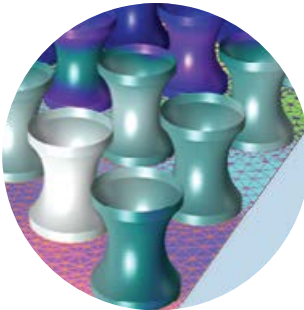
Electrical



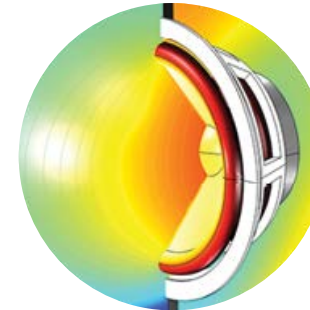
Structural



Fluid



Chemical

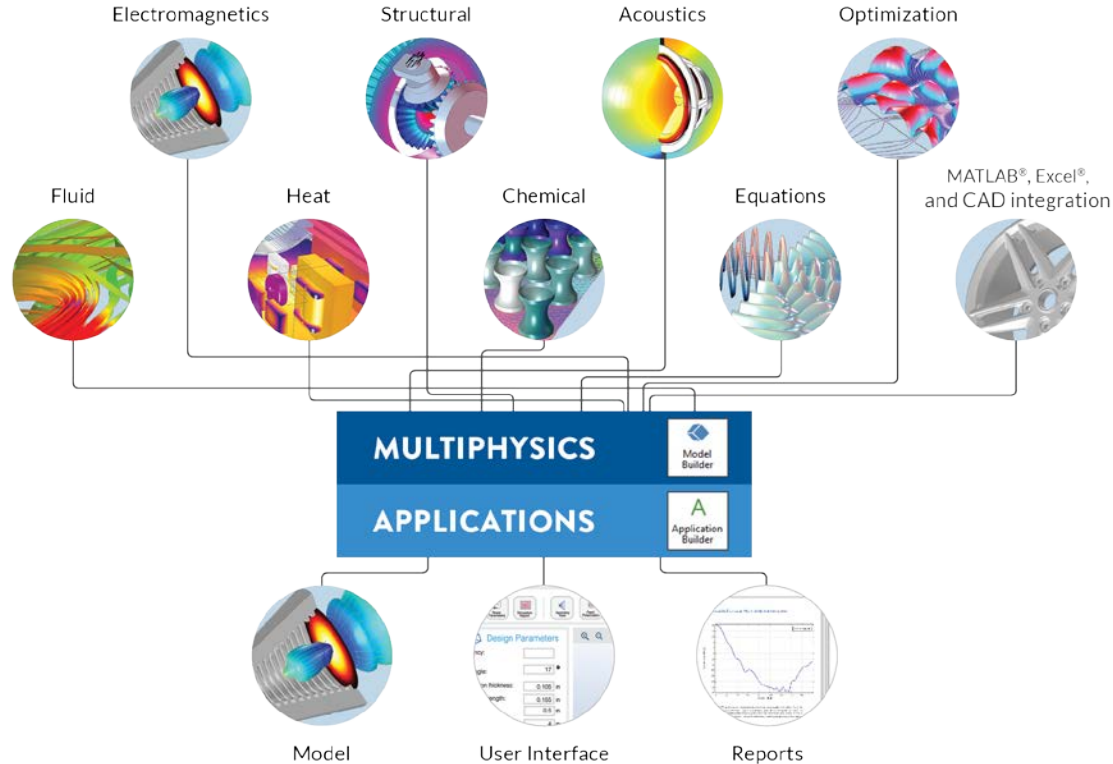


Acoustics



Equations

A Cross-Disciplinary Simulation Environment



A Complete Simulation Environment

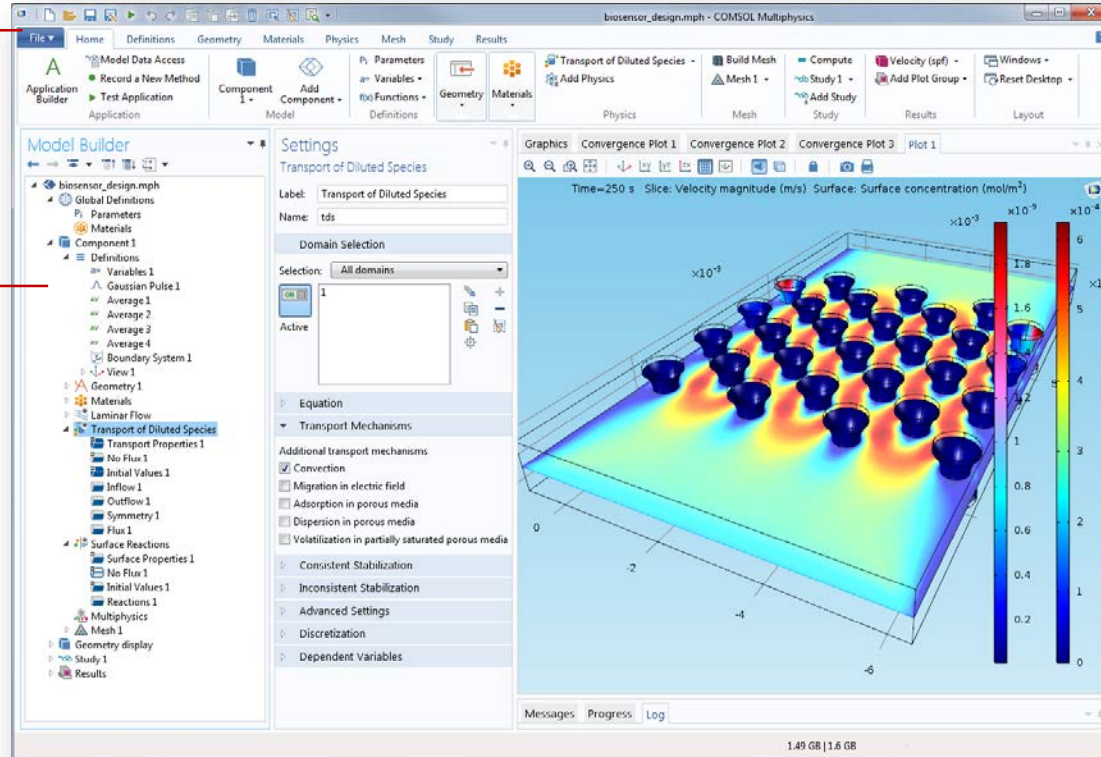
COMSOL Desktop®

Straightforward to use, the Desktop gives insight and full control over the modeling process

Model Builder

Provides instant access to any of the model settings

- CAD/Geometry
- Materials
- Physics
- Mesh
- Solvers
- Results



Graphics Window
Ultrafast graphics presentation, stunning visualization

COMSOL Server™

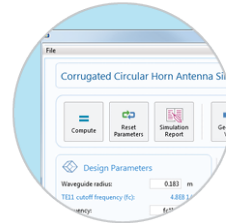
Application Library



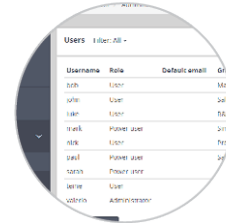
Browser client



Windows® client



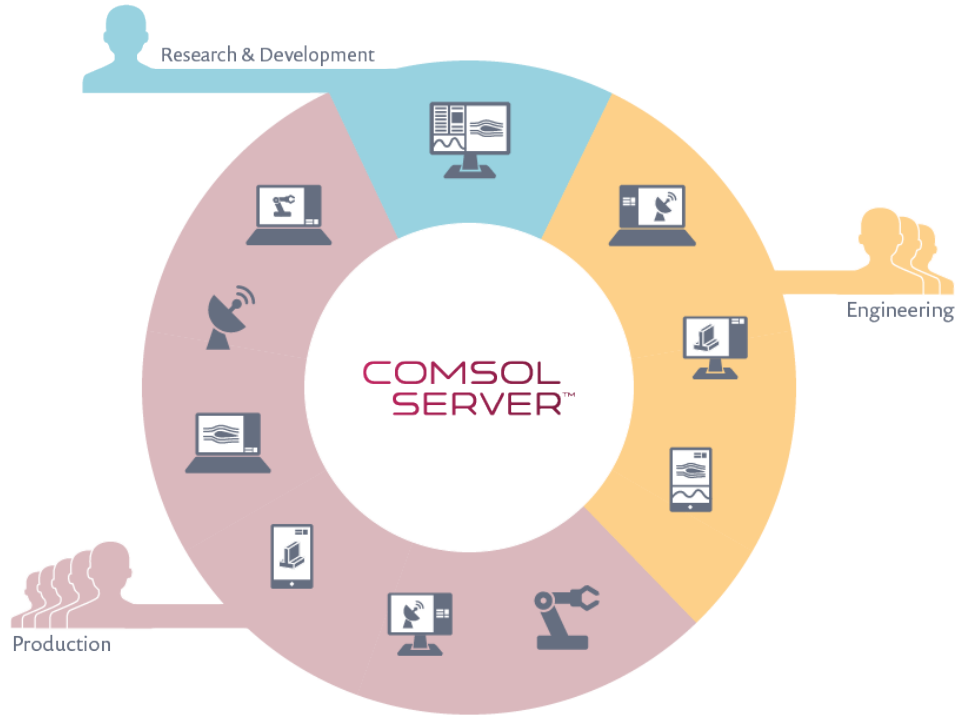
User management



Appearance



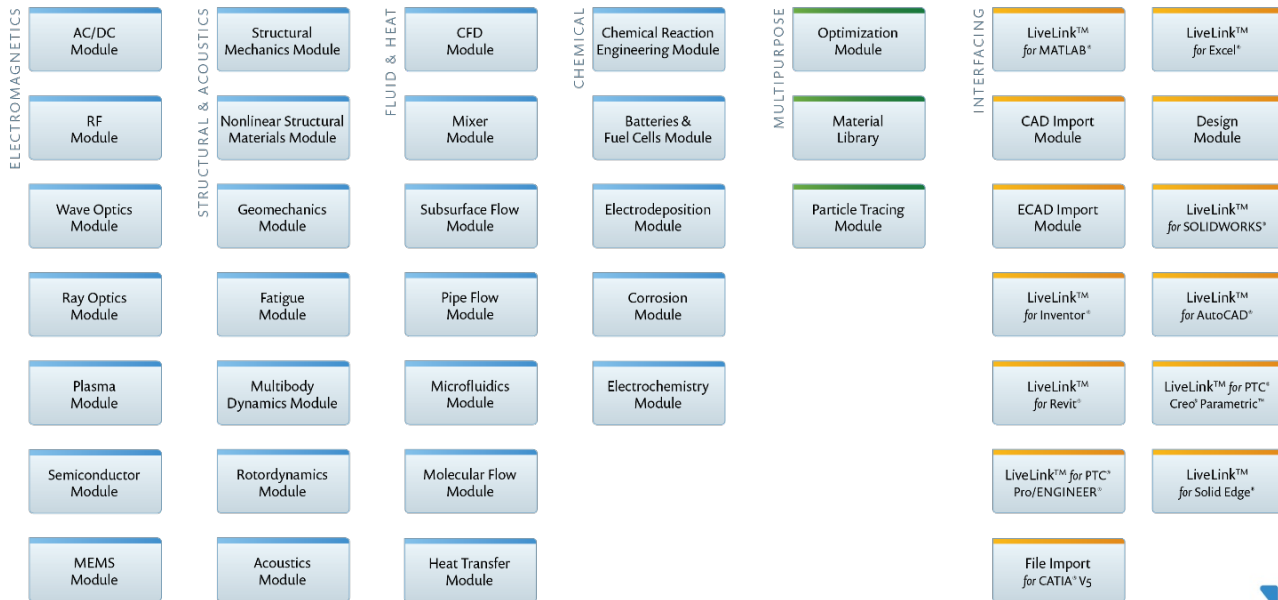
App Deployment



COMSOL® Product Suite

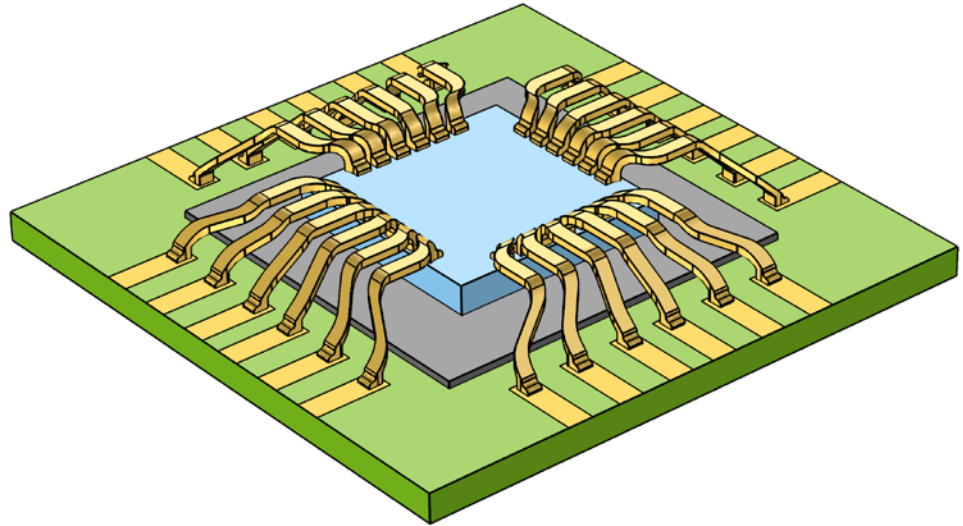
COMSOL Multiphysics®

COMSOL Server™



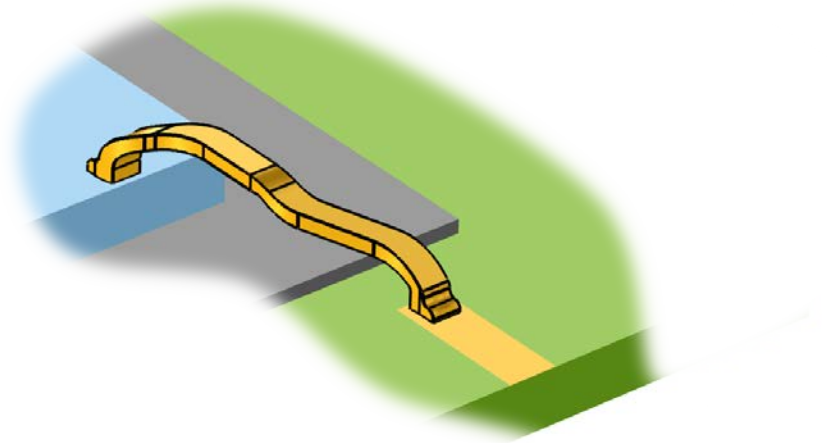
Heating of chip bond wires

- Problem: These wires have differing lengths and cross-section. We need to check if they will get too hot.



Multiphysics Problem

- We will compute the electric currents and the resultant temperature rise and stresses in one wire
- What we know:
 - The geometry
 - The wire material
 - The applied voltage
 - The thermal environment
 - The structural constraints



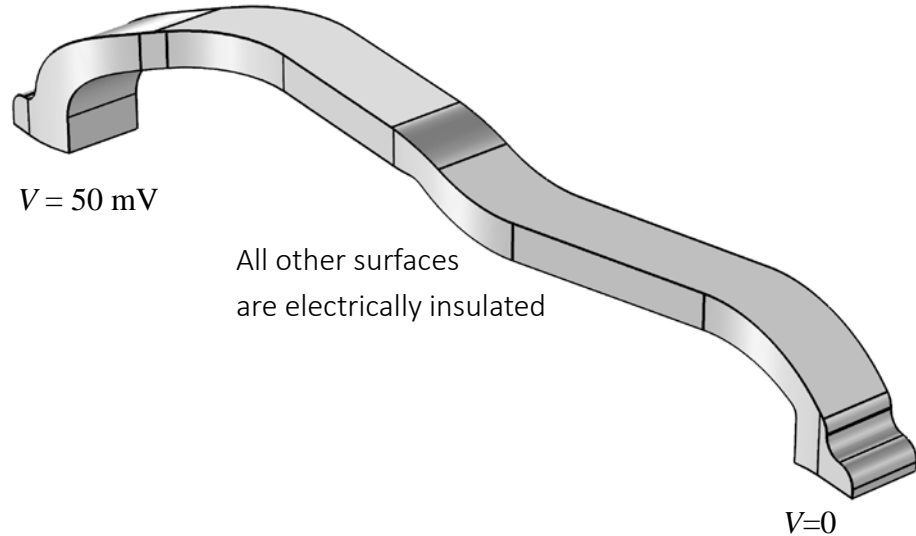
The Electric Current Problem

A constant voltage is applied through a single bond wire

Governing Equation:

$$\nabla \cdot (-\sigma \nabla V) = 0$$

↑
Electric
Conductivity



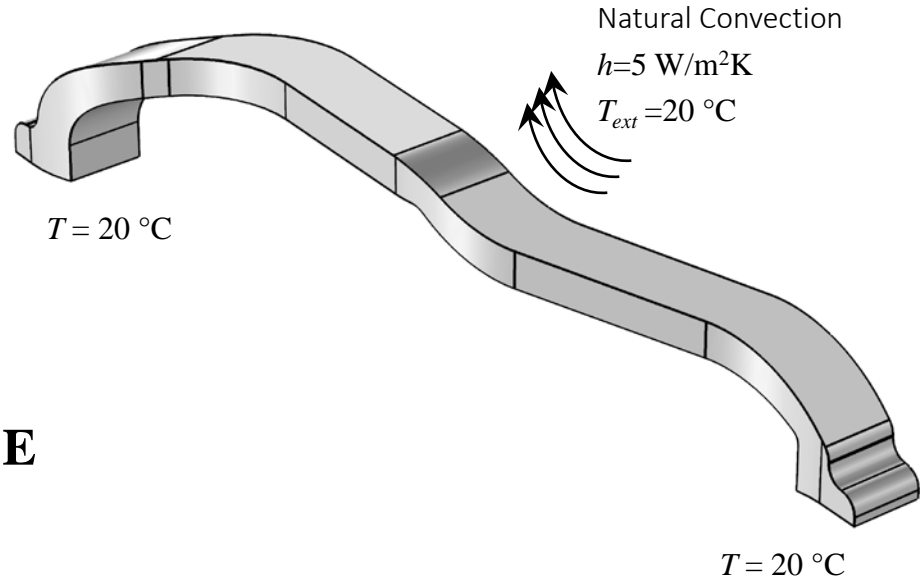
Add in the Heat Transfer Problem

The wire heats up due to the Joule heating

Governing Equation:

$$\nabla \cdot (-k \nabla T) = Q$$

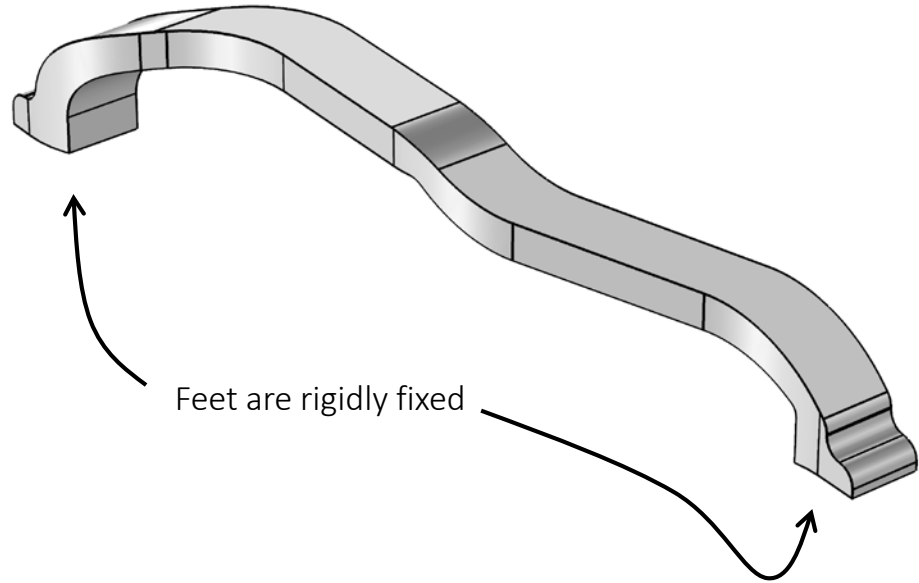
↑ ↑
Thermal Joule heating
Conductivity ↓
 $Q = \mathbf{J} \cdot \mathbf{E} = \sigma \mathbf{E} \cdot \mathbf{E}$



Add the Solid Mechanics Problem

The material experiences a volumetric thermal expansion:

$$\varepsilon = \alpha(T - T_{ref})$$

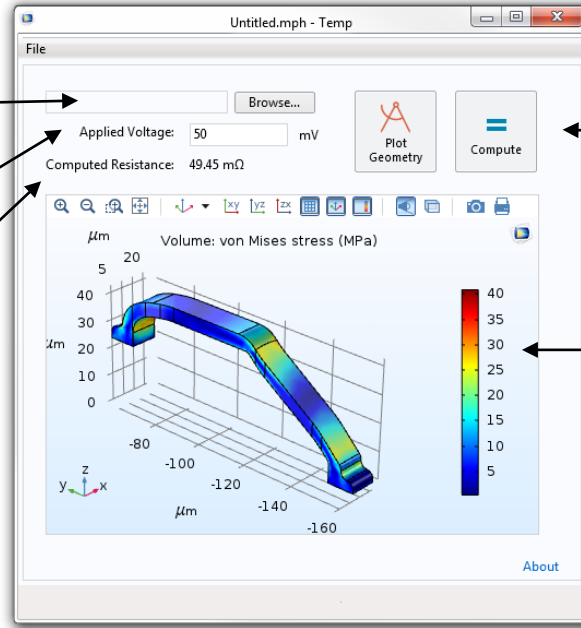


Turn the Model into an App that will work for any similar bond wire CAD files

Use *Data Access* to make the file import available as in input

Expose the applied voltage via a *Global Parameter*

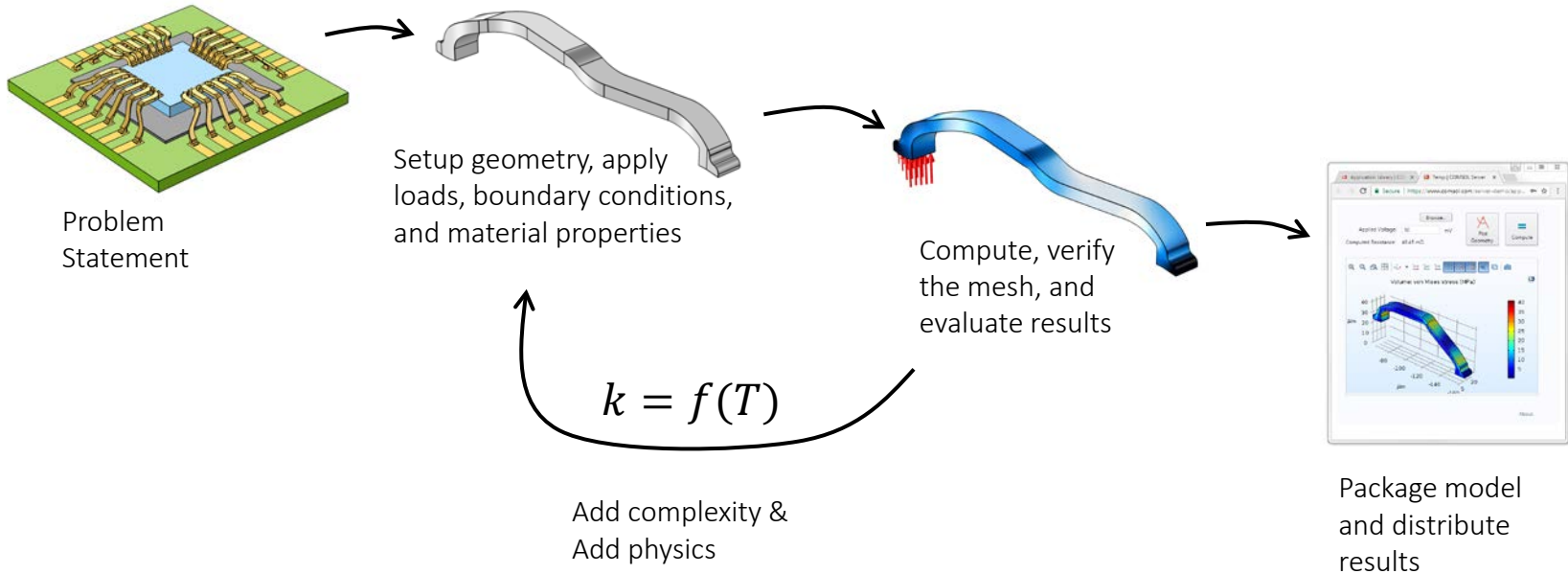
Report the *Derived Values*



Add a button to plot the imported geometry and to compute the solution

Provide a visualization of the results

Always the same workflow



COMSOL CONFERENCE 2018 BOSTON

OCTOBER 3-5
BOSTON MARRIOTT NEWTON

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BANGALORE Aug 9-10
LAUSANNE Oct 22-24
SHANGHAI Nov 1-2

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Chemical Reaction
Engineering • Computational
Fluid • Electromagnetic
Heating • Geophysics and
Geomechanics • Heat Transfer
and Phase Change • MEMS
and Nanotechnology
Microfluidics • Multiphysics
Optics, Photonics
and Semiconductors
Optimization and Inverse
Methods • Particle Tracing
Piezoelectric Devices • Plasma
Physics • RF and Microwave
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Methods and Teaching