The APP as a Tool, A First Principles Approach

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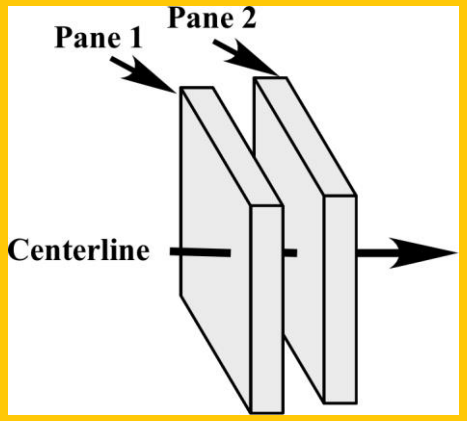
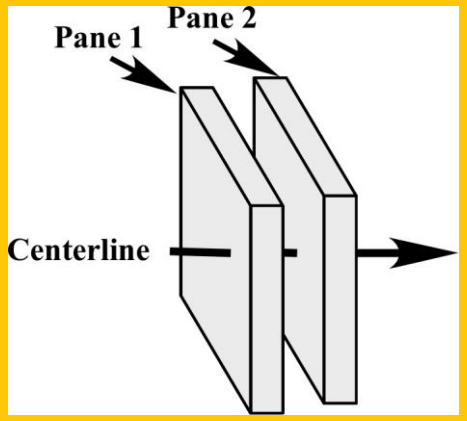
Pryor Knowledge Systems

Introduction

COMSOL Multiphysics® 1D Heat Transfer Model

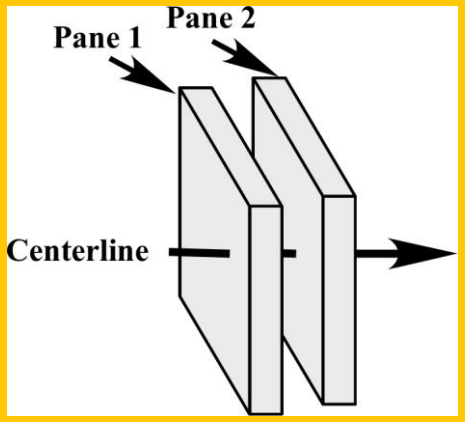


COMSOL Multiphysics® 1D Heat Transfer Model



This APP models the calculation of heat loss (gain) under stationary (steady-state) conditions, for a wide range of applied conditions.

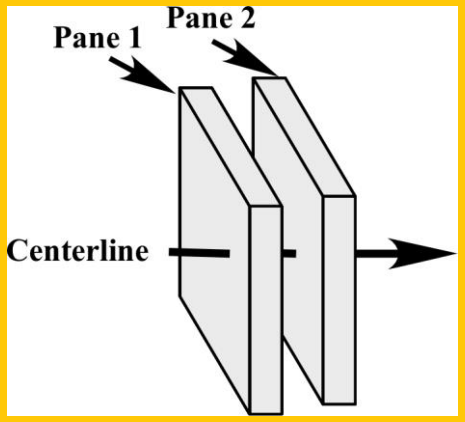
COMSOL Multiphysics® 1D Heat Transfer Model



$$rC_P \frac{\partial T}{\partial t} + \nabla \cdot q = 0$$

$$where\ q = -k\nabla T$$

COMSOL Multiphysics® 1D Heat Transfer Model

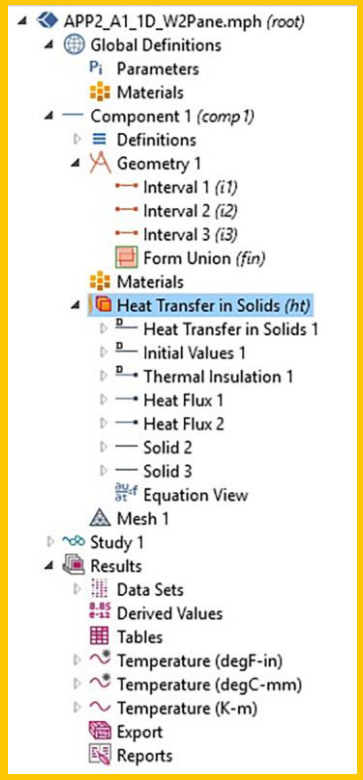


$$rC_P \frac{\partial T}{\partial t} + \nabla \cdot q = 0$$

$$where\ q = -k\nabla T$$

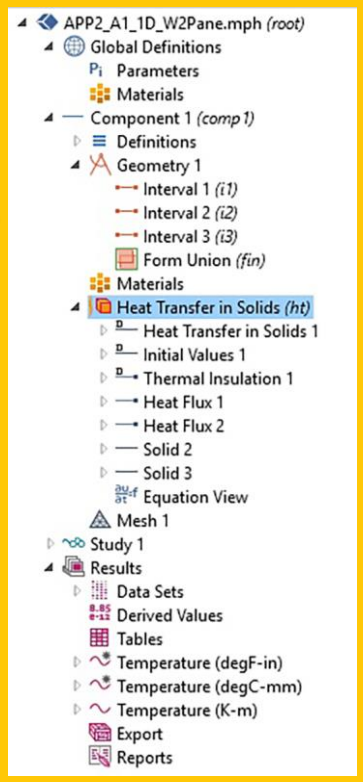
ρ is the density of the material (kg/m^3)
C_P is the heat capacity at constant pressure (J/kg*K)
T is the absolute temperature (K)
k is the thermal conductivity (W/m*K)
q is the conductive heat flux (W/m^2)

COMSOL Multiphysics® 1D Heat Transfer Model



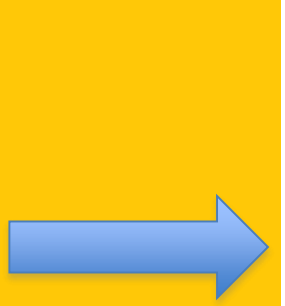
COMSOL Multiphysics® 1D Heat Transfer Model

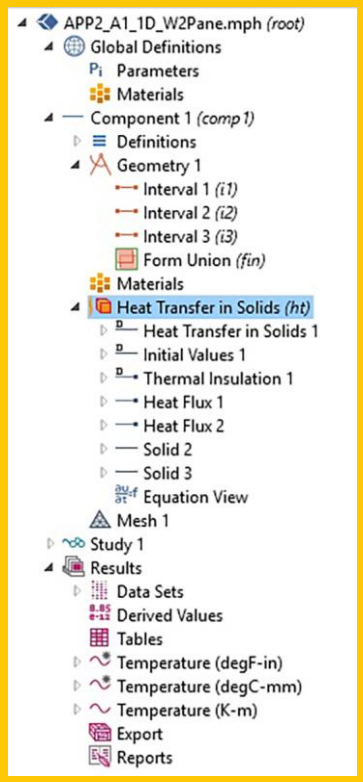
1D Geometry



COMSOL Multiphysics® 1D Heat Transfer Model

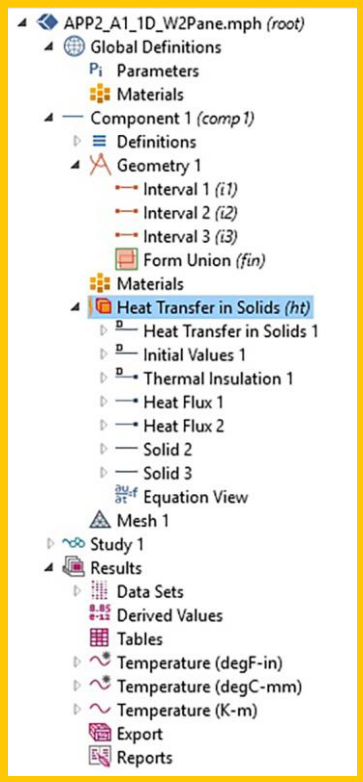
Heat Transfer Parameters





COMSOL Multiphysics® 1D Heat Transfer Model

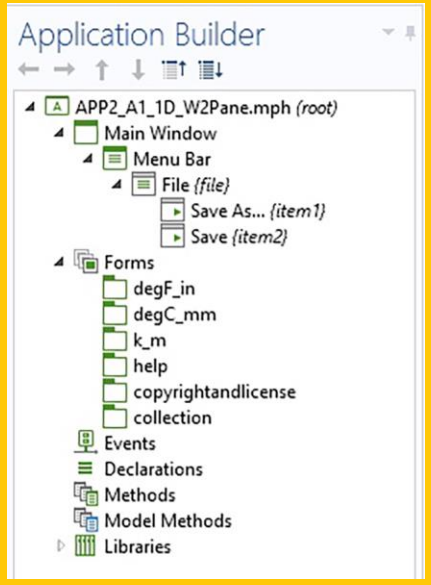
Results Plots



Building The APP

APP Builder: The APP as a Tool: A First Principles Approach

Forms Development



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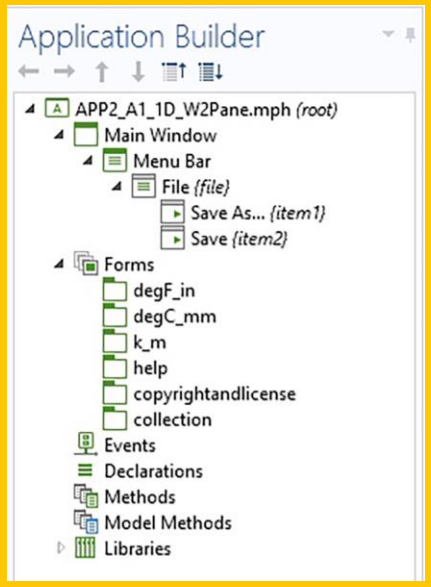
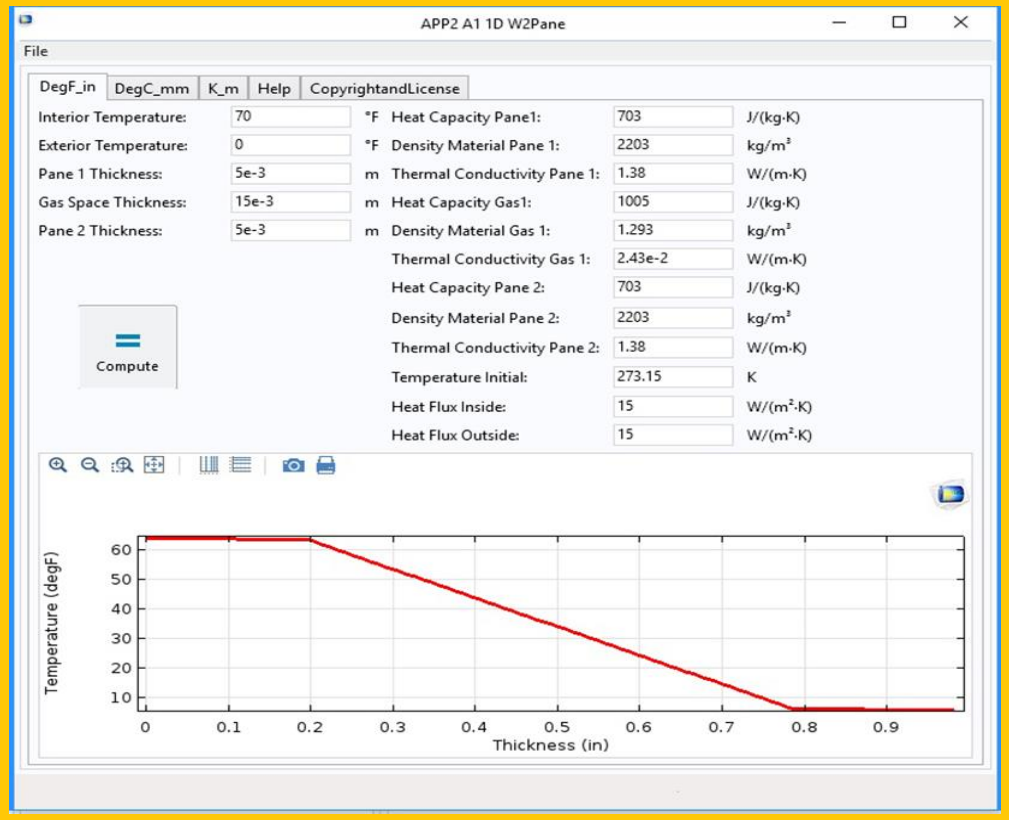
Results Control



APP Builder: The APP as a Tool: A First Principles Approach

APP Front Panel

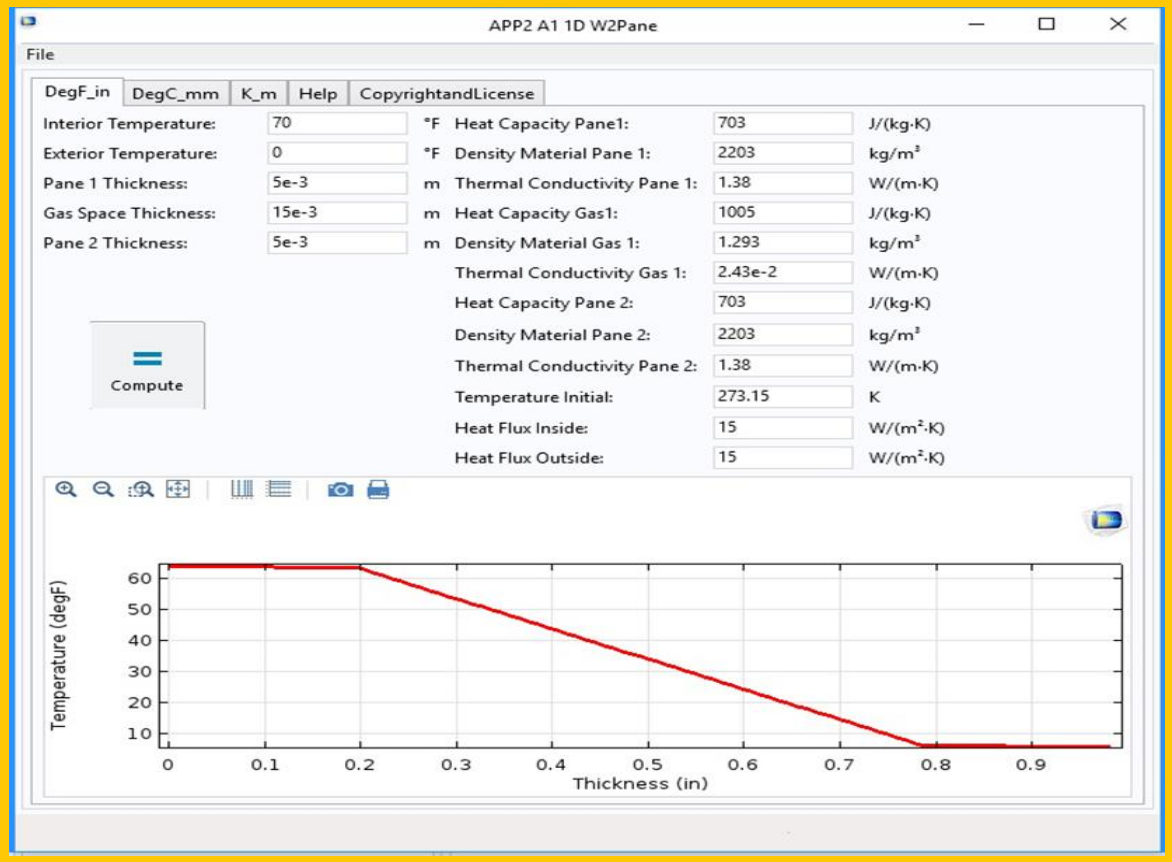


The APP as a Tool: A First Principles Approach

Results

Results: The APP as a Tool: A First Principles Approach

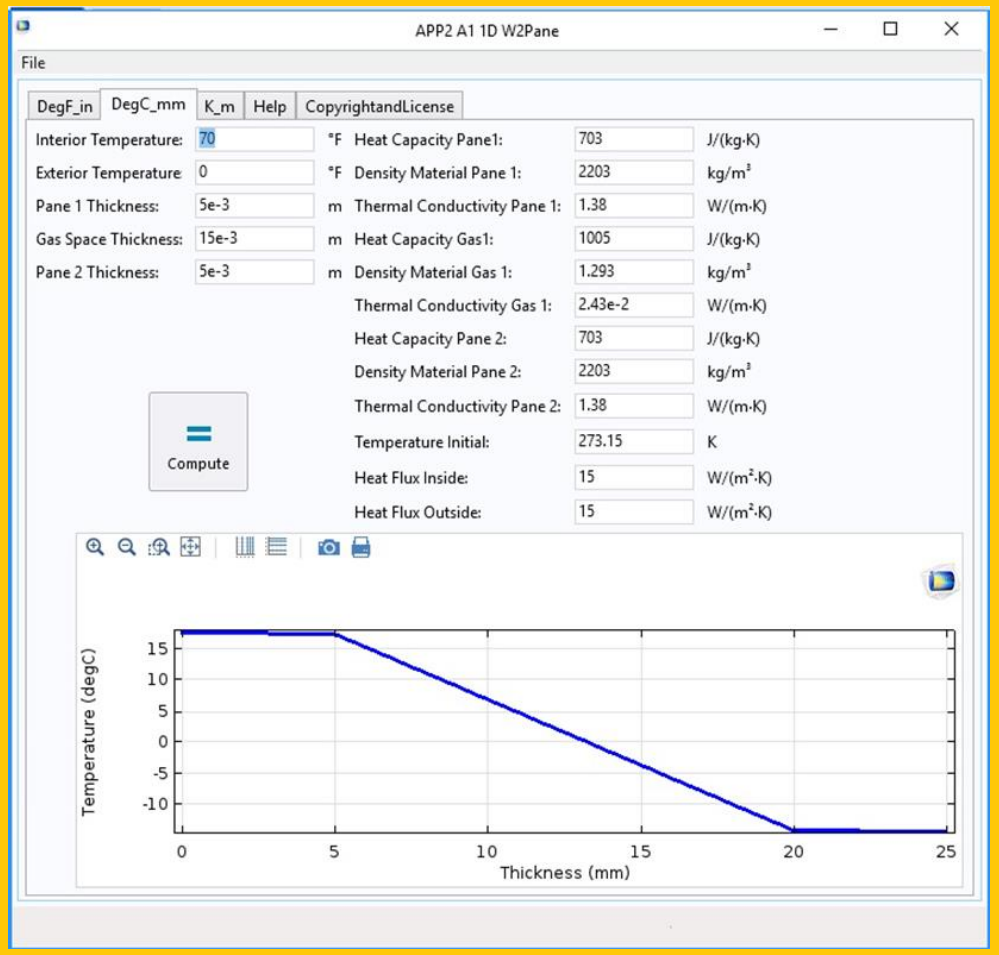
APP
Front Panel
DegF_in



The APP as a Tool: A First Principles Approach

Results: The APP as a Tool: A First Principles Approach

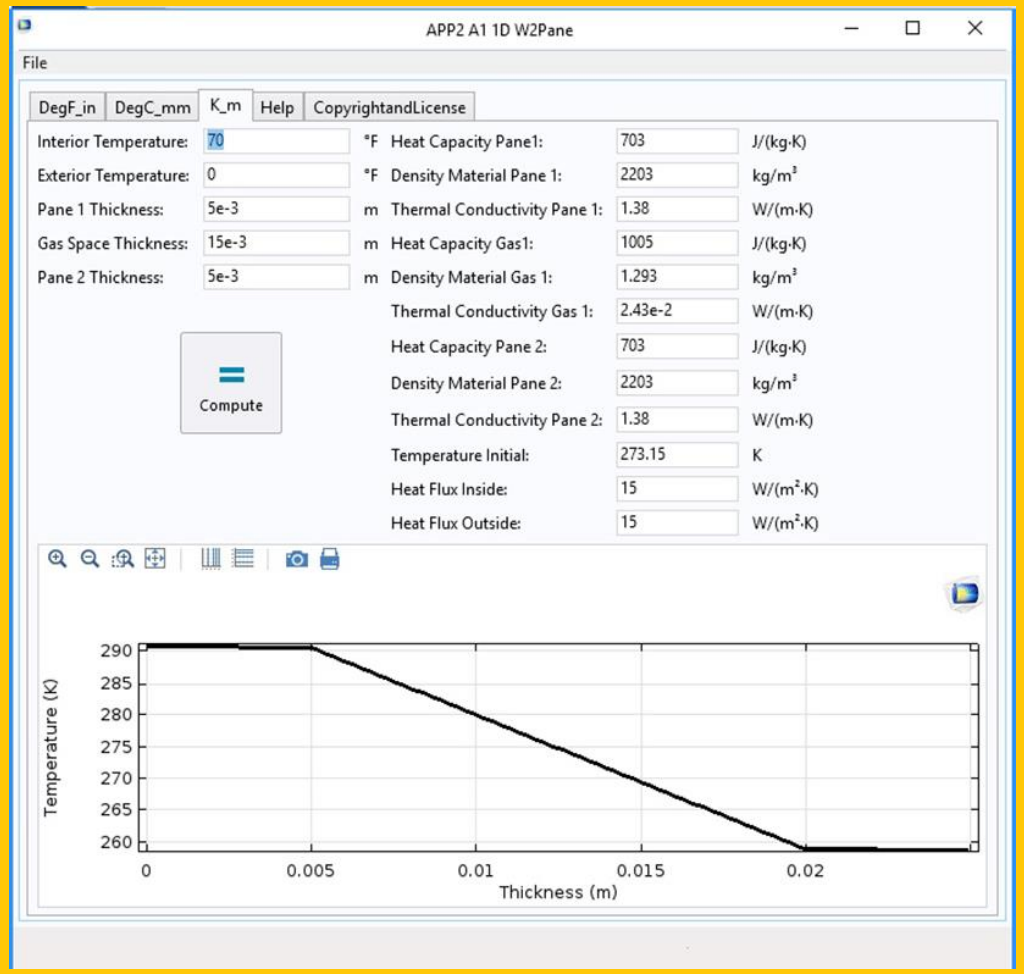
APP
Front Panel
DegC_mm



The APP as a Tool: A First Principles Approach

Results: The APP as a Tool: A First Principles Approach

APP
Front Panel
K_m



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References:

1. R.E.White, Personal Communication, 2017

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2. COMSOL, HeatTransferModuleUsersGuide, V. 5.3, p. 143

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1. R.E.White, Personal Communication, 2017

2. COMSOL, HeatTransferModuleUsersGuide, V. 5.3, p. 143

3. R.W. Pryor, Multiphysics Modeling Using COMSOL 5 and MATLAB, p. 37

The END

Thank You!