

COMSOL (FEMLAB) TUTORIAL

Example 2 (MASS TRANSFER)

Consider a small drop of water, which is at the bottom of a vertical tunnel diffusing in the air contained within it. In order to accelerate the diffusion process, air is blown at the top of the tunnel such that a negligible concentration of water at the top can be assumed. Strictly speaking this problem is transient; however, we can assume it as steady state to determine the concentration profile of water along the tunnel. Let us consider a spherical drop of water with a 1 mm radius as Figure 1. To simplify the analysis, assume a perfectly cylindrical tunnel of 7.5 mm height and 2.5 mm diameter. The diffusion coefficient of water in air is $10^{-6} \text{ m}^2/\text{s}$.

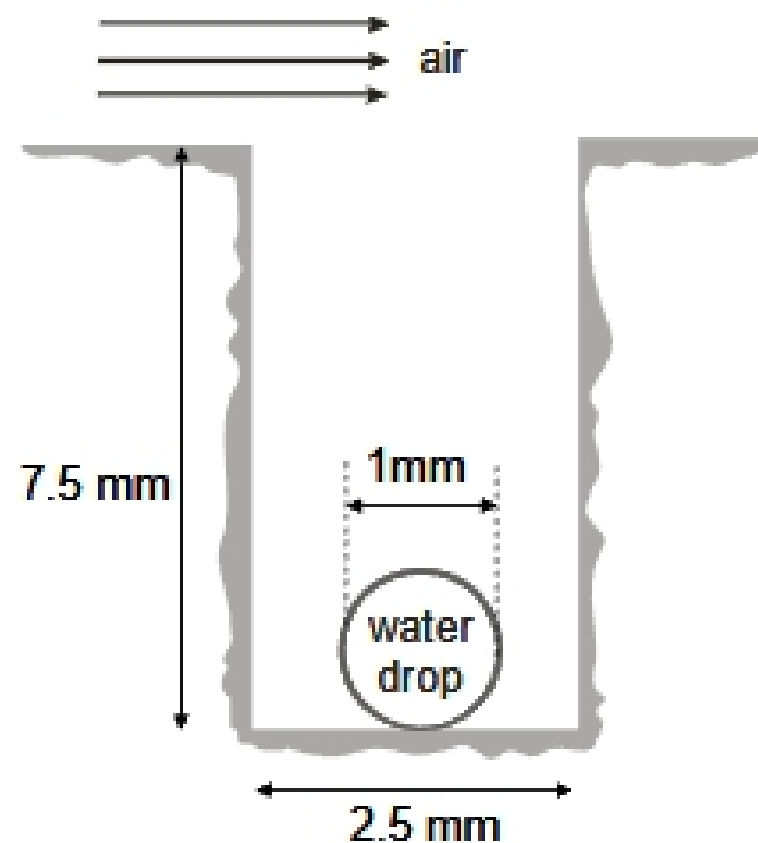


Figure 1

The region of interest is limited by the surface of the drop and the tunnel walls as shown in Figure 2.



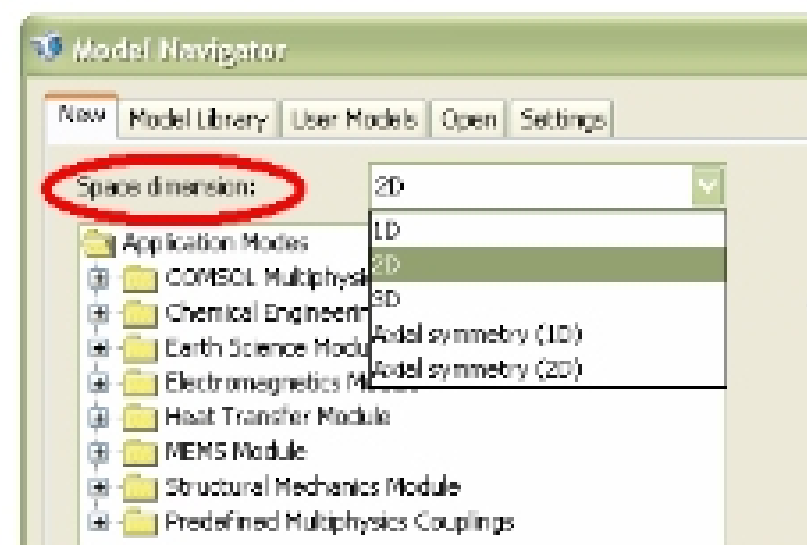
Figure 2

Solution using Comsol Graphical User Interface.

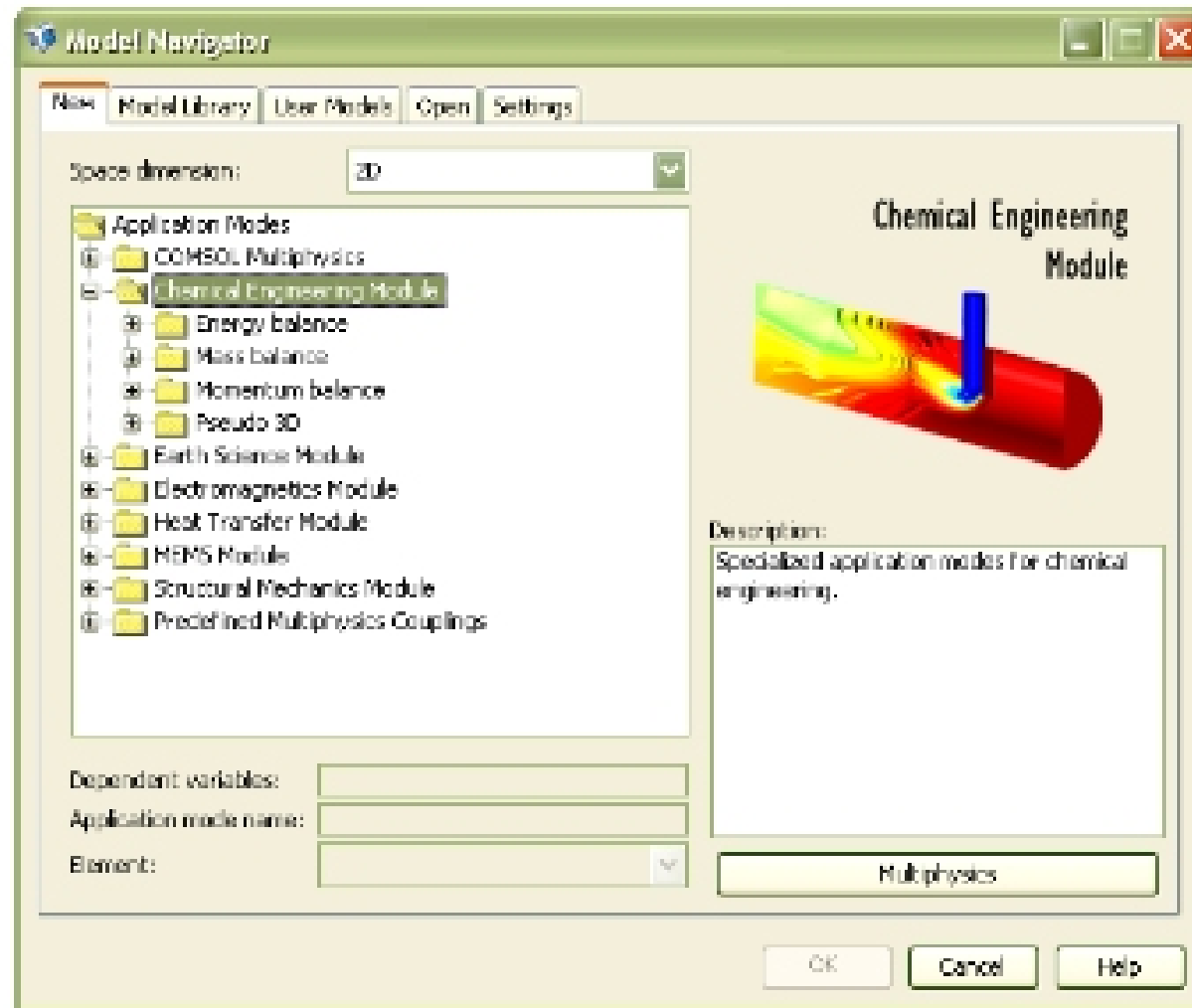
1. Start Comsol by clicking the icon **COMSOL Multiphysics 3.2**



2. Given the symmetry of the system, in the **Model Navigator** window we select 2D.



3. Next, we must select this application mode and to do so we must double-click the option **Chemical Engineering Module**.



4. Next, we double click on the option **Mass Balance**.

