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## **Modeling Of Humidification In Comsol**

In the following study COMSOL Multiphysics® was used to simulate evaporation of water droplets in a stream of heated air. This was a precursor to the modeling of a humidifier, which is used to humidify the air supplied to fuel cell stack. Since the

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percentage of water droplets was relative low, particle tracing method was used for the simulation.

## **Modeling of Humidification using COMSOL Multiphysics®**

Keywords: Humidification, Comsol. 1. Introduction . Humidifiers have become key components in a variety of



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applications ranging from air conditioning to fuel cells. Most often humidifiers rely upon evaporation of water droplets which presents a complex heat and mass transfer problem. Hence it is desirous to model the

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in Comsol Multiphysics 4.4 Indrajit  
Wadgaonkar, Advanced Engineering  
Tata Motors Ltd. Pune

## **Modeling of Humidification in Comsol Multiphysics 4**

We have now reviewed the COMSOL®  
software features dedicated to the

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modeling of heat and moisture transport in moist air. Depending on the application, you may want to solve only for heat transfer and use the temperature prediction to detect condensation, or you may need to go further by computing the temperature and moisture distributions in a coupled way.

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## **How to Model Heat and Moisture Transport in Air with COMSOL®**

One of the main parameters to consider during the nuclear waste storage design phase is the drum corrosion risk. The humid-air corrosion models available in literature predict that, for carbon steel, the phenomena start to become

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appreciable for relative humidity (RH) values close to 65%.

## **Numerical Modeling and Performance ... - COMSOL Multiphysics®**

humidity (Rh). Two finite element models evaluating the coupled thermal and hygric transport have been

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developed using COMSOL Multiphysics®. The two developed models were verified with the normative benchmark test of European Provisional Standard prEN 15026. These models appear to be valid predictive tools to investigate the impact of a change in

**Simulation and Verification of ... -**

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## **COMSOL Multiphysics®**

We assumed that the patient is wearing trousers and long-sleeve shirt therefore his clothing level is 0.61 (clo). If humidity is 50% then PMV is -1.59 and PPD is 56%. Therefore the probability of patient being dissatisfied with the room temperature is 56%, with sensation of cool.

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## **CFD Modeling for the Ventilation System of ... - COMSOL** ☐☐

To download the MPH-files, log in or create a COMSOL Access account that is associated with a valid COMSOL license. Note that many of the examples featured here can also be accessed via the Application Libraries that are built



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into the COMSOL Multiphysics ® software and available from the File menu.

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This model takes into account species, momentum and heat transport phenomena within porous glass matrix

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zone, and thermal analysis in the heater core area. The purpose of the model is to evaluate the effect of humidification for the various scenarios of the operation of a fuel cell power system.

## **Computational Multiphysics to Optimize Humidification ...**

A membrane humidifier for automotive

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fuel cell systems is modeled and analyzed in this paper based on basic thermodynamic laws. This lumped model describes the transient behavior of the humidification phenomena and captures the time varying aspect of the flow rate, temperature, pressure and relative humidity.

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## **Modeling and Simulation of a PEM Fuel Cell Humidification ...**

Theoretical modeling Relative Humidity:  
 $RH \% = P_a / P_s$  .  $P_a$  - absolute vapour pressure  
 $P_s$  - saturation vapour pressure . By determining  $P_s$  at particular temperature, we can derive  $P_a$  for various humidity.  $P_a$  can be converted to concentration by using the

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formula  $\rho = 1.293 \text{ kg/m}^3 = 0.02166 \cdot P \cdot a / (t+273.16)$  derived from  $PV=nRT$ . To get in mols/m. 3

## **DESIGN OF MEMS BASED RESPONSE CAPACITIVE HUMIDITY SENSOR**

The simple COMSOL field models helped us understand the various mechanisms involved in pyrite oxidation and the

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resulting generation of heat and the formation of convective air currents which will help in the development of the more complex field- scale models of actual rock piles (DRA-38).

## **DRA-37: COMSOL MODELS**

other field simulation in COMSOL Multiphysics • Elastic shear and pressure

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waves • Perfectly matched layers (PMLs)  
for elastic and piezo waves •  
Thermoelastic effects • 2D or 3D  
modeling • Retrieve Impedance,  
Admittance, Current, Electric Field,  
Voltage, Stress-strain, Electric Energy  
Density, Strain Energy Density

## **Electromagnetics Modeling in**

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## **COMSOL Multiphysics**

A PEMFC model shown has been simulated using COMSOL Multiphysics. The structure consists of a stacked structure of a PEM fuel cell with specific dimensions. The structure consists of three compartments namely the Anode console, Cathode console (each consisting of electrodes, gas diffusion



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layer and a catalyst layer) and the electrolyte membrane assembly.

## **Comparative analysis of 2D and 3D model of a PEMFC in COMSOL**

COMSOL Multiphysics is an interactive engineering and physics tool that performs equation based modeling in a visual interface. This software allows the

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modeling and simulation of any physical phenomena in a way that's easy to implement. It comes pre - installed with different model libraries that can be readily used. Some of the libraries

## **How to design a Capacitive Sensor using COMSOL**

The proposed model is simulated in the

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COMSOL and studied the effects of thickness of membrane on the performance of the PEM fuel cell. Theoretical model shows that the performance of PEM fuel cell improves as thickness is scaling down towards nanoscale. The model has been validated with the experimental results trends and comparisons shows

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## **Three-Dimensional PEM Fuel Cells Modeling using COMSOL ...**

moisture simulation environment for modeling and simulating dynamic heat, air and moisture processes in buildings and systems. All models are implemented in the computational software package MatLab with the use of

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SimuLink and Comsol. The main advantages of this approach are:

## **Integrated heat air and moisture modeling and simulation**

Computing laminar and turbulent moisture flows in air is both flexible and user friendly with the Moisture Flow multiphysics interfaces and coupling in

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the COMSOL Multiphysics® software. Available as of version 5.3a, this comprehensive set of functionality can be used to model coupled heat and moisture transport in air and building materials.

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