Determination of Material Parameters of Gas Diffusion Layers by Combining Pore-Morphology Method and Single-Phase Simulations

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Abstract for Presentation

In most flow simulations of fuel cells the gas diffusion layer is modeled as homogenised porous medium. The properties of this porous medium are described by saturation and compression dependent parameters: capillary pressure, permeability, diffusivity and heat conductivity.

In this talk we will present a numerically efficient approach to determine these material parameters. Starting from a 3D tomography image of a gas diffusion layer or a 3D stochastical model of the fibre structure the distribution of gas and water phase is determined using the pore morphology method [1]. Using these 3D phase distributions, we are able to determine permeability, diffusivity and heat conductivity as a function of the saturation of the porous media with comparatively low numerical costs. Using a simple model for the compression of the gas diffusion layer, the influence of the compression on the parameter values is studied.

References

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