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Model of an Evaporating Drop Experiment[1] NICOLAS RODRIGUEZ, Trinity University — A computational model of an experimental procedure to measure vapor distributions surrounding sessile drops is developed to evaluate the uncertainty in the experimental results. Methanol, which is expected to have predominantly diffusive vapor transport, is chosen as a validation test for our model. The experimental process first uses a Fourier transform infrared spectrometer to measure the absorbance along lines passing through the vapor cloud. Since the measurement contains some errors, our model allows adding random noises to the computational integrated absorbance to mimic this. Then the resulting data are interpolated before passing through a computed tomography routine to generate the vapor distribution. Next, the gradients of the vapor distribution are computed along a given control volume surrounding the drop so that the diffusive flux can be evaluated as the net rate of diffusion out of the control volume. Our model of methanol evaporation shows that the accumulated errors of the whole experimental procedure affect the diffusive fluxes at different control volumes and are sensitive to how the noisy data of integrated absorbance are interpolated. This indicates the importance of investigating a variety of data fitting methods to choose which is best to present the data.

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