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MODELING THE MICROPHYSICS OF MULTICOMPONENT AEROSOLS BY THE QUADRATURE METHOD OF MOMENTS

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Abstract

The quadrature method of moments has proven to be a very efficient tool for representation of single component aerosols (e.g. sulfate) in a sub-hemispheric scale model (Wright et al., this meeting). This representation includes nucleation, condensation growth and evaporation, and coagulation - all within the context of a three- dimensional Eulerian transport model. The basic feature of moment methods is that they permit the direct tracking of the moments of an aerosol size distribution without requiring more complete knowledge of the size distribution itself. The quadrature extension enables the moment evolution equations to be cast in closed form for condensational growth laws and coagulation kernels of arbitrary functional form (R. McGraw, Aerosol Sci. and Technol. 27, 255, 1997). Aerosol physical and optical properties are computed as desired directly from the moments. This calculation is especially convenient for those properties that can be represented as integrals over the (generally unknown) size distribution. This poster will explore some of the ways that moment methods and quadrature can be used to model both internal and external mixtures of composition-resolved aerosols and example calculations will be presented. It is shown that moment closure is preserved by quadrature, as in the single-component aerosol case, thereby permitting the efficient representation of composition-resolved aerosols in large-scale models.