P1.10 PARTICULATE MATTER MODELING IN THE HOUSTON-GALVESTON AREA USING CIT

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Particles in the earth's atmosphere play an important role in atmospheric chemistry, climate, and human health. Atmospheric formation and removal of these particles are governed by a number of complex dynamic processes, including nucleation, condensation/evaporation, coagulation, chemical reactions in the gas and aerosol phases, and wet/dry deposition. Current models incorporate a comprehensive set of physical and chemical processes. The description for modeling the atmosphere is difficult because the computational problems, which this introduces into the models, are extensive.

The U.S. Environmental Protection Agency (EPA) created the National Ambient Air Quality Standards for particular matter(PM) in 1996 to prevent health problem arising from high PM intake. In addition to the 85 parts per billion (ppb) 8-hour averaged ozone standard, the 24-hour PM standard for PM with diameters less than 2.5 μm (PM2.5) is set 65 $\mu g m^{-3}$ and for PM with diameters less than 10 μm (PM10) is set to 155 $\mu g m^{-3}$. Conditions in urban areas like Houston have been traditionally in violation of ozone. However much progress has been made to improve ozone levels in urban areas due to the control of No_x and VOC emissions. The effectiveness of such control is generally improved through sensitivity studies with the aid of three-dimensional air quality models. In the same manner, various attempts have been made to quantify the effects of emission reduction upon aerosol formations. However there have been the restrictions due to computational constraints. In the availability of parallel computers and efficient numerical algorithms, the similar approach is now feasible and provides valuable information on control strategies of particular matter.

The goal is to develop reasonable models that describe the situation in the Houston-Galveston area. The CIT air quality model with aerosol modeling capability and its associated components are used to understand causes of ozone and particulate matter in the Houston-Galveston area. In order for this modeling system to gain increasing acceptance and use in guiding air quality management, it is important to assess how transportable this modeling system is across geographic domains. We describe the application of this modeling system to evaluate the performance and to assess its sensitivity to emission control options in the Houston-Galveston area.

References

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