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Modeling the Multiphase Atmospheric Chemistry of Launch Clouds

Authors: [B. B. Brady](#); [L. R. Martin](#); [AEROSPACE CORP EL SEGUNDO CA](#)

Abstract: The adaptation is described of a widely available subroutine library, originally developed to model chemical **vapor** deposition to model a plume of steam and hydrogen chloride gas that is released during solid rocket booster launches such as the Space Shuttle and the Titan IV. Hydrogen chloride is a very hygroscopic gas, and it tends to form an aerosol cloud from the water **vapor** in the atmosphere as well as from the steam released by engine combustion and launch deluge water. The aerosol cloud is the most difficult feature to model because it involves phase changes, complex thermodynamic data for HCl/water solutions, and rapid changes in temperature, concentration, and relative humidity. The model predictions are compared to field data taken during a launch of the Space Shuttle.

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