

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Large eddy simulation of ice particle growth in aircraft contrails¹

ANUP SHIRGAONKAR, SANJIVA LELE², Stanford University — Dispersion of the exhaust jet of a cruising aircraft and its mixing in the vortex-wake affect the ice particle growth in contrails. A numerical study of the wake-jet system is conducted to quantify contrail growth using large eddy simulations. The ice phase is calculated using Lagrangian particle tracking. We assess the trends in ice growth with varying ambient relative humidity. Subsaturated, saturated, and highly supersaturated atmospheres are considered. Current results show that in a subsaturated atmosphere, the mean particle radius develops a distinct peak (in time) and then decays to the soot particle radius. The peak location and magnitude are dictated mainly by the atmospheric temperature. When the atmosphere is supersaturated with respect to ice, contrail growth is monotonic in the early stages. Results for ice volume density and particle size distribution will be presented.

¹Supported by FAA

²Ref: A. Shirgaonkar and S. Lele, AIAA Paper 2005-4909

Anup Shirgaonkar

Date submitted: 12 Aug 2005

Electronic form version 1.4