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Study of High-Altitude Aircraft Wake Dynamics. Task I. Problem Definition.

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Abstract: The purpose of the High-Altitude Aircraft Wake Dynamics Study has been to investigate the chemically reacting wake of an aircraft flying at subsonic and supersonic velocity in the upper troposphere and stratosphere. This is of interest because of the effects these exhaust gases could have upon the chemical balance in the stratosphere. In the study, the chemical and fluid mechanical behaviors of important emission species were traced from the time the species exited the engine exhaust nozzle to the time aircraft-induced perturbations to the atmospheric environment were no longer important. The important features of chemically reacting aircraft wakes have been identified. The aircraft wake is modeled in terms of the **jet** regime (wake age approximately 10 sec) vortex regime (approximately 100 sec) and the wake **dispersion** regime (approximately 100 sec). The important thermochemical reactions were found to take place in the **jet** regime.

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