effect on the longitudinal velocity profile when $\alpha=0$.† The difference between theory and experiment shown in Fig. 3 of Ref. 1 is small and may be due to a nose effect or some other experimental factor. In Fig. 2 the longitudinal velocity component profiles are compared at $\alpha=3$ deg and for $\theta=90$ deg and 270 deg. Here the differences are too large to be quantitatively acceptable.

Thus we conclude that the first place where the consequences of the large value of the expansion parameter $(\alpha x/r)$ appear is the longitudinal velocity component, and hence in the formula for the displacement thickness.

†If the flow is axially symmetric, that is, if the flow of an incompressible fluid is independent of azimuthal coordinate, the azimuthal momentum equation is uncoupled from the longitudinal momentum equation and the mass conservation equation.

Note that basic trends are not obscured even when $(\alpha x/r)$ is of the order of one-half.

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References

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Errata

Model Predictions of Latitude-Dependent Ozone Depletion due to Supersonic Transport Operations

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IN the process of paging, some of the text on page 1739 was transposed. The text of page 1739 should read as follows:

. . .except HNO_3, NO_2, O_3, N_2O, $HC\ell$, and H_2O_2 is chemical equilibrium. Because HNO_3, $HC\ell$, and H_2O_2 are water soluble, their number densities are set equal to zero at the lower boundary. The number densities of NO_2 and N_2O are fixed at 3×10^9 cm^{-3} and 7.5×10^{12} cm^{-3}, respectively, at the lower boundary while that of O_3 is fixed at 6×10^{11} cm^{-3} (see Ref. 9).

The chemistry employed in this model is a simplified version of that used in our one-dimensional model studies.[10] At each time step, the model calculates the concentrations of O_3, $O(^3P)$, $O(^1D)$, NO_2, NO, NO_3, N_2O, N_2O_5, HNO_3, HNO_2, H_2O_2, HO_2, N, OH, H, $C\ell$, $C\ell O$, and $HC\ell$.

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The profiles of N_2, O_2, H_2O, H_2, CH_4, CO, and CO_2 are held fixed (at the experimentally determined values) during the calculations.

The rate coefficients are shown in Table 1, and the photolysis rates at zero optical depth are given in Table 2.

Transport

The mean meridional circulation is obtained by the kinematic method from the averaged equation of mass continuity. With the assumption that the density field is in a steady state, the approximate form of this equation in spherical coordinates is

$$\frac{1}{R\cos\phi}\frac{\partial(\bar{\rho}\bar{v}\cos\phi)}{\partial\phi}+\frac{\partial(\bar{\rho}\bar{w})}{\partial z}=0 \tag{5}$$

where the overbar denotes an average with respect to time and longitude, $\bar{\rho}$ is the bulk density, $\bar{v}$ and $\bar{w}$ are the meridional and vertical velocity components, R is the radius of the earth, and ϕ the latitude. Equation (5) implies the existence of a "stream function" ψ for the total mass flux such that

$$2\pi R\bar{\rho}\bar{v}\cos\phi=-\frac{\partial\psi}{\partial z} \qquad 2\pi R\bar{\rho}\bar{w}\cos\phi=\frac{\partial\psi}{R\partial\phi} \tag{6}$$

If the distrubution of $\bar{\rho}$ and $\bar{v}$ is known, the first of these can be integrated vertically, and $\bar{w}$ can be obtained from the second.

Up to 20 km, the density was obtained from data presented by Oort and Rasmusson,[46] and above that altitude by vertical integration of the hydrostatic equation, using mean (rocket) temperatures.[47]

The $\bar{v}$ components were based on the results[46] up to 20 km. These values were then extrapolated to the top of the model by imposition of a simple vertical profile that matched the 20-km value and satisfied the kinematic constraint that there be no. . .