VARIATION OF HOT OXYGEN CALCULATED BY NRLMSISE00 MODEL

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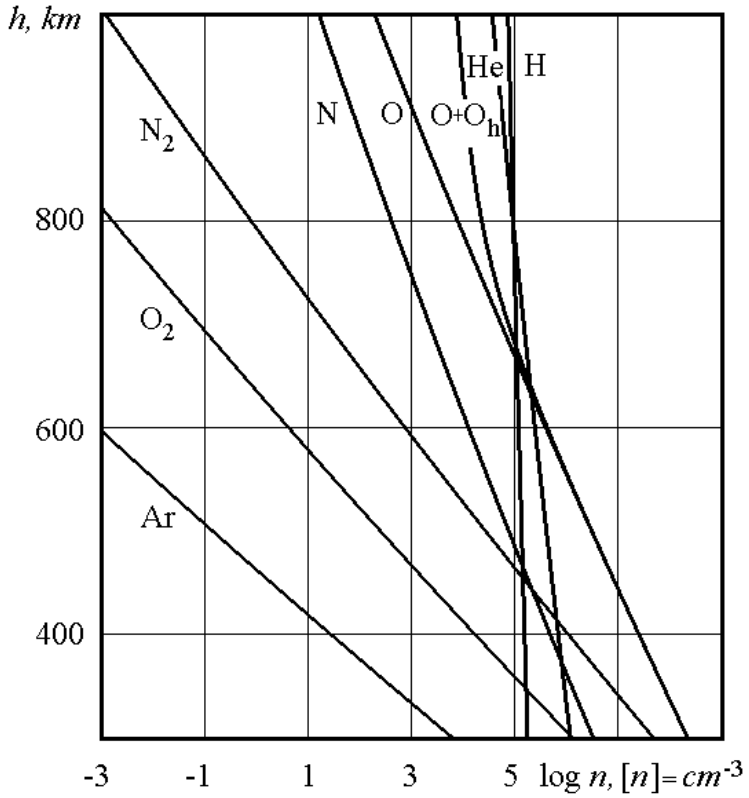
Empirical models of the neutral atmosphere are an indispensable tool used for theoretical simulation of ionospheric processes. The NRLMSISE-00 empirical atmospheric model is the latest version of MSIS-class empirical models (MSIS-86, MSIS-90). The main difference to MSISE90 is the addition of hot oxygen at altitudes above 500 km. Hot atomic oxygen is oxygen atoms with an energy exceeding the thermal energy of the remaining O atoms.

The hot oxygen density depends on number of day in a year, altitude, geographic latitude and longitude, local or universal time, average $F_{10.7}$ index of solar activity, value of $F_{10.7}$ index on the previous day, and average value of magnetic index A_p on 24 hours before the calculating moment. Thus, summer density values are higher than winter ones.

The figure shows the results of calculations of the altitude profiles of the density of neutral atmosphere components for the coordinates of the Kharkiv region, including the oxygen profiles $n_O(h)$ and $n_{O+O_h}(h)$ at midday of the summer solstice with Covington index $F_{10.7}=100$ and index $A_p=2$.



Hot neutral oxygen atoms play a significant role in the formation of excited ions above 500 km. At heights of the F2 region maximum, hot neutral oxygen atoms can be neglected.