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大气模式动态测定的研究

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摘 要

利用 12 万组大气阻力资料，对 DTM-1994 模式进行改进，获得了一个新的大气模式。该模式的特点是：

1．利用 2 阶周日峰效应，代替了原来模式中的复杂的周日效应表达式，减少了模式参数 (少于 50 个)，并使模式参数均具有明确的物理意义；

2．分清了模式的主要参数和次要参数，在主要参数中，又分清了利用阻力资料可以改进的参数和可能改不好的参数；

3．与 MSIS-1990 和 DTM-1994 模式相比，其互差可以被接受，说明使用卫星阻力资料可以进行大气模式动态改正，不仅能测定大气总密度，并且能测定大气的分密度；

4．与卫星轨道相比较，改进模式明显优于 MSIS-1990 和 DTM-1994 模式。在 120 km 轨道附近，改进模式密度比 MSIS-1990 模式大 10%，同时我们在卫星陨落期预报中发现 MSIS-1990 模式密度比实际大气密度小 9%，这说明改进模式的密度与实际大气的密度基本接近。

关 键 词 大气模式 — 阻力数据 — 模式密度

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On the Dynamic Determination of the Atmosphere Model

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Abstract

Based on the 120 000 sets of drag data, we have obtained a new atmospheric model by improving the DTM-1994 model. The new model has the following characteristics:

1. The second order diurnal peak effect was used to replace the original complicated formula for the diurnal effect, which greatly reduces the mumbers of model paramenters(less than 50). Each new parameter has its definite physical meaning.

2. The primary and secondary model parameters were distinguished. Within primary parameters, we further clarigy which one is able to be improved by using drag data and which one may be not.

3. When the new model is compared with MSIS-1990 and DTM-1994 models, the systematic error is acceptable, indicating that drag data from satellites can be used to carry out dynamic adjustment of the atmosphere model. It can determine not only the total atmosphere density, but also the densities of the atmospheric components.

4. When compared with the satellite orbits, there exists significant difference between improved model and current MSIS-1990 and DTM-1994. Around 120 km orbit, improved model density is greater than MSIS-1990 by 10%. Meanwhile, it was found that the MSIS-1990 model density was less than that of the observed atmosphere by 9% when predicton of the satellite orbit during its re-entry is done. This indicates that improved model density is close to the observed atmosphere.

Key words atmosphere model—drag data—density of atmosphere model