基于计算流体动力学的探空温度传感器太阳辐射误差修正方法

作　者：张利, 刘清惓, 杨荣康, 张加宏, 李敏, 戴伟

单　位：南京信息工程大学

基金项目：国家公益性行业（气象）科研专项

摘　要：

高空大气温度是天气预报和气候变化研究所需的关键观测资料，随着对防灾减灾和应对气候变化能力要求的提高，希望探空温度传感器的准确度达到0.1 ℃量级，而太阳辐射引起的误差可达3 ℃量级甚至更高，已成为制约探空温度观测精度提高的瓶颈。本文利用计算流体动力学（CFD）方法对探空温度传感器从地面到32 km高空不同气压和多种引线夹角以及太阳高度角条件下的辐射误差效应进行求解，获得了辐射误差—海拔高度曲线族。研究结果表明，引线夹角以及太阳高度角是太阳辐射误差的重要影响因子。海拔高度与太阳辐射误差之间呈现出随海拔高度的增加斜率不断增大的类抛物线关系。

关键词：温度传感器；太阳辐射误差；计算流体动力学；珠状热敏电阻；探空仪

A Method Based on Computational Fluid Dynamics for Solar Radiation Error Correction of Sounding Temperature Sensors

Author's Name:

Institution:

Abstract:

Air temperature of high altitude is considered as an important factor in both weather forecast and climate change research. Due to the increasing amount of attention that ha s been focused on disaster prevention as well as the need of dealing with climate change, it is expected that the accuracy of the measurement air temperature with high altitude can reach to 0.1 ℃. However, the errors caused by solar radiation may reach 3 ℃ or worse in upper air, which has become the bottleneck when improving the accuracy. A computational fluid dynamics (CFD) method is employed to study the errors induced by solar radiation, under the condition of various air pressures, lead angle, solar incident angle, from sea level to 32 km altitude. The results show that lead angle and solar incident angle are important factors that affect the errors. With the increasing of sea level elevation, the solar heating error appears a parabola correlation, which owns a growing slop.

Keywords: Temperature sensor; Errors of solar radiation; Computational fluid dynamics; Thermistor; Radiosonde

投稿时间：**2012-08-20**

查看pdf文件