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A new kind of velocity in-situ measuring technique for laser-driven flyer system

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Abstract: Based on the laser beam shut-off method, a new kind of velocity in-situ measuring technique is presented, with which a non-contact velocity measuring apparatus is built. The velocity of a flyer is calculated by measuring the time interval in-situ while it flies through the laser screens for a certain distance. For the apparatus, a special miniature laser is employed to produce an optical screen with thichness of tens of micrometers; the photoelectric accepters with a response time less than 1 ns are used to record the time signals when a flyer is launched and arrived. This non-contact velocity measuring apparatus is very simple in components, with high sensitivity and is relatively inexpensive. The experimental data show that the measurement error is less than 5% for a flyer of 3 μm in thickness at a velocity approaching 10 km/s.

Key words: laser-driven flyer; flyer velocity; in-situ measuring of velocity; non-contact velocity measuring apparatus

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航天快讯

嫦娥二号突破 5000 万公里深空

7 月 14 日 1 时许，已成为我国首个人造太阳系小行星的“嫦娥二号”卫星，与地球间距离突破 5000 万公里，再次刷新“中国高度”。目前卫星状态良好，正继续向更远的深空飞行。

“嫦娥二号”卫星是探月工程二期的先导星，于 2010 年 10 月 1 日发射。自 2012 年 12 月 13 日飞越探测“图塔蒂斯”小行星、成功实施再拓展试验以来，“嫦娥二号”卫星进行着中国航天器飞行距离最远的一次“太空长征”，不断刷新“中国高度”，预计 2014 年 7 月星地距离将达到 1 亿公里。

北京航天飞行控制中心（以下简称“北京中心”）总师周建亮介绍，目前，“嫦娥二号”卫星在环绕太阳的轨道上飞行。随着卫星与地球距离逐渐增大，为确保上下行信号可靠稳定、卫星平台安全运行，按照工程领导小组和工程总体的统一部署，北京中心先后对卫星遥测码速率、测控模式、上行功率等进行了调整，对卫星定向天线控制策略进行了改进，提高了测控跟踪能力。根据北京中心轨道计算，预计“嫦娥二号”卫星最远将飞行到距地球约 3 亿公里处。

“嫦娥二号”工程的实施，创造了航天领域多项“世界第一”：首次获得 7 m 分辨率全月球立体影像；首次从月球轨道出发飞赴日地拉格朗日 L2 点进行科学探测；首次对“图塔蒂斯”小行星近距离交会探测，并获得 10 m 分辨率的小行星图像。

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