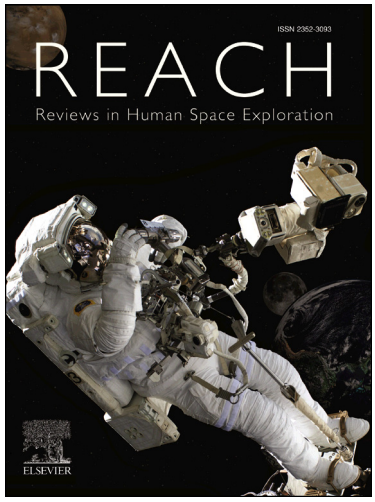

Three Decades of Progress in China's Space High-Tech Program Empowered by Modern Astrodynamics

Jianping Yuan, Yang Yu, Yang Gao, Hengnian Li, Weihua Ma, Xin Ning, Geshi Tang, Yong Shi, Chong Sun, Xingsuo He, Shouhua Zhang, Hexi Baoyin

PII: S2352-3093(16)30027-X
DOI: http://dx.doi.org/10.1016/j.reach.2017.01.001
Reference: REACH 12

To appear in: *Reviews in Human Space Exploration*

Received Date: 15 December 2016
Revised Date: 25 January 2017
Accepted Date: 27 January 2017

Please cite this article as: J. Yuan, Y. Yu, Y. Gao, H. Li, W. Ma, X. Ning, G. Tang, Y. Shi, C. Sun, X. He, S. Zhang, H. Baoyin, Three Decades of Progress in China's Space High-Tech Program Empowered by Modern Astrodynamics, *Reviews in Human Space Exploration* (2017), doi: http://dx.doi.org/10.1016/j.reach.2017.01.001

Available online at www.sciencedirect.com

SciVerse ScienceDirect

REACH - Reviews in Human Space Exploration 00 (0000) 000–000

Three Decades of Progress in China's Space High-Tech Program Empowered by Modern Astrodynamics

Jianping Yuan[a,g*], Yang Yu[b], Yang Gao[c], Hengnian Li[d], Weihua Ma[a,g], Xin Ning[a,g], Geshi Tang[e], Yong Shi[f], Chong Sun[a,g], Xingsuo He[a], Shouhua Zhang[a], Hexi Baoyin[h*]

[a]*Northwestern Polytechnical University, Xi'an, 710072, China*
[b]*Beihang University, Beijing 100191, China*
[c]*Center for Space Utilization, Chinese Academy of Sciences, Beijing 100094, China*
[d]*Xi'an Satellite Control Center, Xi'an, Shaanxi 710043, China*
[e]*Beijing Aerospace Control Center, Beijing 100094, China*
[f]*Stevens Institute of Technology, NJ 07030, USA*
[g]*National Key Laboratory of Aerospace Flight Dynamics, Xi'an, Shaanxi 710072, China.*
[h]*Tsinghua University, Beijing 100084, China*
[*]*Corresponding authors*

Abstract

This year is remarkable for the Chinese space industry, as it marks the 60th anniversary of its establishment, and also coincides with the expiration of the National High-Tech Research and Development Program of China (also widely known as the 863 Program) after three decades. As full participants and the chief scientist of this milestone program for the last decade, we are strongly inspired by the profound role of modern astrodynamics in Chinese space practices. Sharing a common starting point with planetary science, astrodynamics is rooted in the findings of Kepler and Galileo, and its theory was first formulated by Newton. This paper aims to tell the story of the progress and development of astrodynamics in the context of China's space technology reflected throughout the 30-year-long National Space High-Tech Program: the explosive growth of recent Chinese space missions has been strongly encouraged by the progressing of modern astrodynamics. As the plotline of this article, the milestones of Chinese space flight, most of which were supported by the 863 Program, were collected and organized within the framework of the main achievements in modern astrodynamics, and as it will be demonstrated, these amazing space activities paint a clear picture that can be understood as a part of the great journey of human space exploration.

Keywords: 863 Program; Astrodynamics; Chinese space-missions

1. Introduction

This year is celebratory for the Chinese space community: the second manned space lab Tiangong-2 was launched carrying two astronauts who spent 33 days on orbit, which marks a further step towards the planned