LHD 国际学术报告会(主楼 312 会议室 2012 年 8 月 20 日周一上午 9:30-12:00)

报告题目：

Aerothermodynamics Research in the DLR Spacecraft Department

演讲人：

Dr.-Ing. Klaus Hannemann
Head Spacecraft Department

(German AerospaceCenter,Institute of Aerodynamics and FlowTechnology)

时间：2012 年 8 月 20 日（周一）上午 9:30

地点：力学所主楼 312 会议室

邀请人：姜宗林 研究员

报告摘要：

The aerothermodynamic analysis and design activities of the Spacecraft Department mainly address research for hypersonic vehicles and spacecraft. The Department has been involved in all major German and European Space Technology programs during the last two decades. The major objective of the Department is the virtual design of space vehicles and their ground and flight qualification.

With respect to space transportation, initially the main focus was put on the development of ground based testing capabilities and numerical tools. About 10 years ago, a concept for a sky based wind tunnel was proposed in order to be able to generate flight test data by

affordable means. This concept eventually developed into the SHEFEX I project which was led by the Spacecraft Department. In the framework of the SHEFEX II and SHEFEX III projects the responsibility for the aerodynamic design was taken.

The research activities related to rocket propulsion and launchers have been initiated in 2002, and comprise the investigation of nozzle flows and their interaction with the launcher's base flow, and the simulation of rocket thrust chambers.

The current Department's efforts with respect to hypersonic technologies are performed in the framework of technology research projects of ESA, and the European Comission co-funded projects LAPCAT I and II (Long Term Advanced Propulsion Concepts and Technologies), ATLLAS I and II (Aerodynamic and Thermal Load Interactions with Lightweight Advanced Materials for High Speed Flight) as well as FAST20XX.

For the attitude and orbit control of spacecraft, chemical as well as electric thrusters are utilized. For a successful design of the reaction control system, e.g., the correct positioning of the thrusters on the spacecraft, the complete characterization of the plume and its impingement with the spacecraft and resulting potential surface contamination is required. The Department has invested continuous effort in this area and operates the worldwide unique vacuum plume test facility STG-CT for chemical thrusters and since 2011 STG-ET for electric thrusters. Further investigations are concerned with the performance of MEMS based micro-thrusters in the framework of the EC co-funded project PRECISE and with the development of a small hybrid rocket propulsion system. For the latter, the Department operates a ground based test facility at DLR Trauen.