

1. Record Nr.	UNINA9910830287803321
Titolo	Basic research and technologies for two-state-to-orbit vehicles [[electronic resource]] : final report of the collaborative research centres / / edited by Dieter Jacob, Gottfried Sachs and Siegfried Wagner
Pubbl/distr/stampa	Weinheim, : Wiley-VCH, c2005
ISBN	1-280-52056-6 9786610520565 3-527-60571-1 3-527-60550-9
Descrizione fisica	1 online resource (686 p.)
Collana	Deutsche Forschung
Altri autori (Persone)	JacobDieter <1941-> SachsG (Gottfried) WagnerS <1937-2018.> (Siegfried)
Disciplina	629.4 629.47
Soggetti	Space vehicles - Aerodynamics Space vehicles - Design and construction Space vehicles - Materials Space vehicles - Thermodynamics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Basic Research and Technologies for Two-Stage-to-Orbit Vehicles; Contents; 1 Introduction; 2 Network Organization of Collaborative Research Centres for Scientific Efficiency Enhancement; 2.1 Introduction; 2.2 Organization of Collaboration; 2.3 Efficiency Enhancement in Research; 2.4 Efficiency Enhancement in Teaching and Education; 2.5 Internationalization; 2.6 Final Remarks; 3 Overall Design Aspects; 3.1 Conceptual Design of Winged Reusable Two-Stage-to- Orbit Space Transport Systems; 3.1.1 Background and Introduction; 3.1.2 Concepts for Reusable Space Transports 3.1.2.1 Single-Stage-to-Orbit SSTO3.1.2.2 Two-Stage-to-Orbit TSTO; 3.1.3 Design Procedure; 3.1.3.1 Design Tools and Methods; 3.1.3.2 Baseline Concept; 3.1.3.3 Boundary Conditions and Requirements;

3.1.3.4 Variation of Mission and Staging Mach Number; 3.1.3.5 Trade Studies; 3.1.3.6 Evaluation and Comparison of the Concepts; 3.1.4 Variation of Mission and Mach Numbers; 3.1.4.1 Mission Comparison; 3.1.4.2 Comparison of Mach Number Variation; 3.1.4.3 Accelerator Vehicle Concepts; 3.1.5 Trade Studies; 3.1.5.1 Airbreathing Second Stage; 3.1.5.2 LOX-Collection; 3.1.6 Comparison and Evaluation 3.1.7 Conclusion and Outlook 3.2 Evaluation and Multidisciplinary Optimization of Two-Stage-to-Orbit Space Planes with Different Lower-Stage Concepts; 3.2.1 Introduction; 3.2.2 Reference Configurations; 3.2.2.1 Concept Design and Mission Requirements; 3.2.2.2 Space Plane Configuration with Lifting Body Lower Stage; 3.2.2.3 Space Plane Configuration with Waverider Lower Stage; 3.2.2.4 Design and Optimization Parameters; 3.2.3 Analysis Methods; 3.2.3.1 Quality Criteria; 3.2.3.2 Simulation and Optimization Software; 3.2.4 Performance of Reference Space Planes; 3.2.4.1 Mass Breakdown 3.2.4.2 Design Sensitivities 3.2.5 Optimization Results; 3.2.5.1 Nominal Optimizations; 3.2.5.2 Sensitivity-Based Optimizations; 3.2.6 Summary and Conclusions; 4 Aerodynamics and Thermodynamics; 4.1 Low-Speed Tests with an ELAC-Model at High Reynolds Numbers; 4.1.1 Introduction; 4.1.2 Wind Tunnel Models; 4.1.3 Pressure Distributions Influenced by Reynolds Number; 4.1.4 Flow Field Influenced by Reynolds Number; 4.1.5 Force Coefficients Influenced by Reynolds Number; 4.1.6 Conclusion; 4.2 Experimental and Numerical Analysis of Supersonic Flow over the ELAC-Configuration; 4.2.1 Introduction 4.2.2 Experimental Setup 4.2.3 Numerical Method; 4.2.4 Results; 4.2.4.1 Flow Over the Orbital Stage and the EOS/Flat Plate Configuration; 4.2.4.2 Separation of ELAC1C and EOS; 4.2.5 Conclusions; 4.3 Stage Separation - Aerodynamics and Flow Physics; 4.3.1 Introduction; 4.3.2 Methodology and Vehicle Geometries; 4.3.3 Numerical Simulation; 4.3.3.1 Flow Solver; 4.3.3.2 Grid Generation; 4.3.4 Experimental Simulation; 4.3.4.1 Models and Facility; 4.3.4.2 Measurement Technique and Test Programme; 4.3.5 Steady State Flow; 4.3.5.1 Dominant Flow Phenomena; 4.3.5.1.1 Inviscid Case - 2D and 3D Simulations 4.3.5.1.2 Viscous Effects - Laminar and Turbulent Flow

Sommario/riassunto

Focusing on basic aspects of future reusable space transportation systems and covering overall design, aerodynamics, thermodynamics, flight dynamics, propulsion, materials, and structures, this report presents some of the most recent results obtained in these disciplines. The authors are members of three Collaborative Research Centers in Aachen, Munich and Stuttgart concerned with hypersonic vehicles. A major part of the research presented here deals with experimental and numerical aerodynamic topics ranging from low speed to hypersonic flow past the external configuration and through inlet