SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Technologies (5)

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ADVANCED LAUNCHER TECHNOLOGY MATURATION SUPPORTED BY EU-AERONAUTIC RESEARCH PROJECTS

Abstract

The Seventh Framework Programme (FP7) for Research and Technological Development is the EU's main instrument for funding research in Europe and it runs from 2007-2013. While the Space Call is addressing in a large part applications such as GMES, the Aeronautics and Air Transport section also includes a topic "Pioneering the air transport of the future" which supports inter alia some high speed aviation concepts.

Hypersonic vehicles require technologies which are in a large part similar to advanced space transportation technologies. Two of these currently running FP7 projects with a funding level of several million each are described in this paper.

The FAST20XX (Future high-Altitude high-Speed Transport 20XX) project is running since the end of 2009 and is managed by ESA-ESTEC. It aims at providing a sound technological foundation for the industrial introduction of advanced high-altitude high-speed transportation in the medium term and in the longer term. No detailed vehicle design is planned in the study but the mastering of technologies required for any later development. The identified critical technologies will be investigated in depth by developing and applying dedicated analytical, numerical and experimental tools.

The work package 3 of FAST20XX is looking at technologies for High-Energy Suborbital Transportation: Mission Definition and System Analysis of the SpaceLiner, advanced active cooling, Flow and Flight Control, Advanced Structures, Low-Density Effects in Suborbital Flight and Flight Dynamics and Safety.

The new project CHATT (Cryogenic Hypersonic Advanced Tank Technologies) is the second project example which is coordinated by DLR-SART. One of its core objectives is to investigate Carbon Fiber Reinforced Plastic (CFRP) cryogenic pressure tanks containing propellants like liquid hydrogen, liquid methane and possibly liquid oxygen.

The proposed research in CHATT will increase the knowledge within Europe to a practical cryogenic tank demonstrator level for future aerospace reusable lightweight composite cryogenic structures. The advantages and disadvantages of using liner/linerless tank designs will be investigated as well as issues related to the realisation of more complex geometrical tank shapes. Four different subscale CFRP-tanks are planned to be designed, manufactured, and tested under mechanical and thermal loads. Other technologies related to cryogenic propulsion are additionally addressed. A central, steering role is applied to system requirements of advanced passenger airplanes, the development, test and implementation of engineering methods and tools.

The paper presents the technologies relevant for future launchers which are maturated within FAST20XX and CHATT. Major research results, as far as available, will be summarized.