SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems Concepts (1)

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DLR ADVANCED STUDY GROUP: KUBE - ANALYSIS ABOUT THE POSSIBILITIES OF KUIPER BELT EXPLOITATION AND EXPLORATION

Abstract

At the Bremen Institute of Space Systems of the German Aerospace Center (DLR) and within the Department of System Analysis Space Segment (SARA) a group for investigating new and future space concepts has been founded in early 2011 – the Advanced Study Group (ASG). One of the topics investigated in its third instalment has been the Kuiper Belt Exploitation and Exploration (KUBE) analysis, which involved review of the possibility to explore and exploit the Kuiper Belt e.g. for positioning of space stations, telescopes or a GPS analogue positioning system for the whole solar system. This paper will describe the results of innovative concepts for exploiting the resources available in the numerous bodies of this solar system region after a short description of the available materials given by the Kuiper Belt Objects' composition. One concept e.g. describes the application of self-replicating spacecraft to gather and transport resources from this region to other areas of the solar system or create on-site infrastructure. Another investigates the idea of using the belt as a staging ground for a number of satellites establishing a solar-system positioning system (SPS). Also the possibility to conduct science missions is regarded. Trade-offs, calculations and initial analyses on feasibility are presented along with a thorough review of the Kuiper Belt environment and current technology especially regarding mining and manufacturing autonomously. The paper finishes with a scenario on how to best use the Kuiper Belt to further exploration of the solar-system and possibly even beyond.