MARSHALL SPACE FLIGHT CENTER
NASA FACULTY FELLOWSHIP PROGRAM (NFFP)
RESEARCH/TASKS AVAILABLE FOR SUMMER 2004

Flight Projects Directorate

TITLE OF RESEARCH/TASK
Space Infrastructure Concepts Development

BRIEF DESCRIPTION OF RESEARCH/TASK
This research task is to develop a space launch infrastructure concept as described to determine overall feasibility. The concept consists of 4 major systems of which 2 have been developed in prior studies and will be provided to the researcher as reference materials. These are as follows:

1. Launch Tower: Several studies have determined the feasibility for construction of multi-kilometer height towers for launch assist. This concept will utilize this work as the basis for an assumed launch tower for the proposed space launch vehicle to provide its initial launch assist to orbit.
2. Reusable Launch Vehicle (RLV): The primary emphasis of this research will be to design a reusable vehicle to deliver payloads to low-earth-orbit (LEO) and return utilizing the infrastructure elements described.
3. Propellant Depot: A prior NASA study will be provided describing a (LEO) propellant depot, which will be the destination for the launch vehicle. The depot will accept payloads for attachment to reusable transfer vehicles operating from the depot; accept delivery of propellants or water for conversion to propellants for storage at the depot; and refuel the RLV for its return flight and propulsive reentry.
4. Propellant Delivery: A secondary task will be to explore the feasibility for delivery of water and propellants to the depot utilizing the RLV, and current expendable launch vehicle systems.

Note that the primary emphasis of this research is to create an overall infrastructure that will enhance the capabilities of an RLV vehicle by increasing payload capabilities through launch assist and reducing thermal protection/reentry requirements that refueling on orbit could provide. This research will be utilized to build spreadsheet models that will allow exploration of variables in launch tower height, launch assist velocity, vehicle sizing, payload capabilities, and propulsive reentry scenarios.

DISCIPLINARY FIELDS REQUIRED/APPLICABLE FOR RESEARCH/TASK
Aerospace Engineering

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DEPARTMENT
Advanced Projects Office

TITLE OF RESEARCH/TASK
Multi-Purpose Logistics Module Cargo Integration Systems Enhancement

BRIEF DESCRIPTION OF RESEARCH/TASK
Participant shall evaluate current payload/cargo containment devices (soft wall, rigid wall, hazardous, non-hazardous, etc.) with intent of improving capability. Trade spaces will then be developed for future focus with regard to evaluation of capability versus cost and technical risk. Special consideration will need to be given to the structural requirements of the transportation system and human factors of astronauts working in a zero-gravity environment.

DISCIPLINARY FIELDS REQUIRED/APPLICABLE FOR RESEARCH/TASK
Human Factors, Materials, Structures

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DEPARTMENT
Flight Systems Department

TITLE OF RESEARCH/TASK
Multi-Purpose Logistics Module Vehicle Systems Enhancement

BRIEF DESCRIPTION OF RESEARCH/TASK
Participant shall develop an electronic interface capability between an existing MPLM solid-state controller/data recorder to an existing wireless instrumentation system. The intent of the study will be development of a flight demonstration experiment that exercises numerous wireless command and control capability for aerospace flight vehicles.

DISCIPLINARY FIELDS REQUIRED/APPLICABLE FOR RESEARCH/TASK
Electrical design, wireless data transmission

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DEPARTMENT

Flight Systems Department

TITLE OF RESEARCH/TASK
Validate International Space Station HOSC Resources and Service Agreements

BRIEF DESCRIPTION OF RESEARCH/TASK
Validate International Space Station resources and service agreements. Utilize the incident reports and HOSC problem reports to validate return of service of POIC hardware against baselined restoration times. Develop trends of hardware failures of POIC equipment.

DISCIPLINARY FIELDS REQUIRED/APPLICABLE FOR RESEARCH/TASK

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DEPARTMENT
Ground Systems Department, Mission Systems Operations Group FD43