Orbiter Space Flight Simulator

2010 Graphics Client and Server Version

TRAJECTORY SOFTWARE FOR LOW EARTH ORBIT AND BEYOND LEO ANALYSIS, DESIGN AND REAL TIME OPERATIONS

NASA Request for Information
Solicitation Number:
NNJ10ZHD001L

Due May 28, 2010

Thomas Lee Elifritz
Director of Research
The Tsiolkovsky Group
Marshall Space Flight Center
Marshall, Wisconsin 53559 USA

https://www.fbo.gov/index?s=opportunity&mode=form&id=85eb669c713ea685297a4c67a7369121&tab=core&_cview=1

Synopsis:

This notice is issued by the National Aeronautics & Space Administration/Johnson Space Center (NASA/JSC) to post a Request for Information (RFI) via the internet in order to solicit information about potential sources for information and planning purposes, and to allow industry the opportunity to verify reasonableness and feasibility of the requirement. This is an RFI only and does not constitute a commitment, implied or otherwise, that NASA will take procurement action in this matter. Further, neither NASA nor the Government will be responsible for any cost incurred in furnishing this information.

This RFI is being used to gather research for NASA to make decisions regarding trajectory software for analysis, flight configuration, and real time operations work. This RFI applies to software that include many of these core capabilities in both low Earth orbit (LEO) and beyond LEO environments: core capabilities, trajectory modeling, prediction and control, trajectory determination, trajectory simulation, visualization and plotting, 6 degree of freedom (DOF) simulation (i.e. translation and rotation), or interfacing with an external 6 DOF simulation.

General Information

Solicitation Number:	NNJ10ZHD001L
Posted Date:	May 13, 2010
FedBizOpps Posted Date:	May 13, 2010
Recovery and Reinvestment Act Action:	No
Original Response Date:	May 21, 2010
Current Response Date:	May 28, 2010
Classification Code:	B -- Special studies and analysis – not R and D
NAICS Code:	927110 - Space Research and Technology

Contracting Office Address

NASA/Lyndon B. Johnson Space Center
Houston Texas, 77058-3696, Mail Code: BH

Description

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This RFI is being used to gather research for NASA to make decisions regarding trajectory software for analysis, flight configuration, and real time operations work. This RFI applies to software that include many of these core capabilities in both Low Earth Orbit (LEO) and beyond LEO environments:

Trajectory modeling, prediction, and control

Trajectory determination

Trajectory simulation

Visualization and Plotting

6 degree of freedom (DOF) simulation (i.e. translation and rotation) or interfacing with an external 6 DOF Simulation.

RFI responses must include:

• ***Section 1***

Name of the primary point of contact for the response.

Thomas Lee Elifritz

Address Redacted

Business title.

Director of Research

Company affiliation.

The Tsiolkovsky Group

Email address.

Email Redacted

Phone

Landline Redacted

Cell Phone Redacted

Identification of other key individuals who collaborated on the RFI response.

No other individuals collaborated on this RFI response.

• ***Section 2****: A brief summary description, not to exceed one page, of the candidate software as it relates to the core capabilities listed above.*

Orbiter Space Flight Simulator is a free, closed source, open API software package running in any Windows Operating System with a minimum of system requirements.

The package is compiled on Microsoft Visual Studio in C++ by Dr. Martin Schweiger. The latest stable release version 060929 Patch is dated September 29, 2006, and has been described in presentations at both the 2nd and 3rd ESTEC Astrodynamics conferences :

Schweiger M, *Orbiter: A free spacecraft simulation tool*, 2nd ESA Workshop on Astrodynamics Tools and Techniques, ESTEC, Noordwijk, 13-15 September 2004. Presentation: PDF [1.5MB], PowerPoint [2.1MB].

Schweiger M, *Spacecraft simulation and visualisation with Orbiter 2006*, 3rd International Workshop on Astrodynamics Tools and Techniques, ESTEC, Noordwijk, 2-5 October 2006. Presentation: PDF [2.5MB], PowerPoint [12MB].

On May 24, 2010 Dr. Schweiger uploaded a release candidate version 2.5 which includes an externally loadable graphics client module, a scripting agent and a server environment. The goal of this restructuring was to disentangle the post processing and display from the internal physics and geometry, allowing developers much greater freedom and flexibility in display sophistication - freeing up the geometry and physics engine for development.

I had previously used the 060929 version of Orbiter to conduct trade studies on heavy lift launch vehicles, analyzing fuel consumption and flight profile optimization to low Earth orbit with several realistic engine, fuel, booster, core and upper stage configurations.

I have also recently responded to a NASA MSFC Heavy Lift Launch and Propulsion RFI 05042010PS40, and although I had not intended to respond to any further RFIs related to the new NASA space policy, I had inadvertently run across this particular RFI well after the response date was extended. Cursory examination of the software dictates proposing the Orbiter Space Flight Simulator again as ‘game changing public outreach technology’.

After consulting with the Orbiter user community and Dr. Schweiger, I have decided that although the state of the program is well below the levels of value and quality you desire, it satisfies minimum requirements for trajectory analysis, design and real time operations. I have thus decided to take time to present this solution as an informal recommendation.

The software simulations speak for themselves, and many of you may be familiar with it. Orbiter Space Flight Simulator enjoys a wide and diverse use base, it is accurate enough to quickly answer sophisticated orbital trajectory questions, and it is interfaceable with many standard orbital and trajectory descriptions, representations and display techniques. The latest version contains many improvements in the user interface that greatly enhance its abilities to interact with a variety of external inputs and produce portable output files. This is a quickly evolving orbital trajectory simulator with a large, well trained user base.

• ***Section 3****: Include past and/or existing customers and their contact information, if available.*

This software package is collaborative freeware offered by Dr. Martin Schweiger.

Dr. Martin Schweiger's URL : http://www.medphys.ucl.ac.uk/~martins/

Orbiter Wikipedia URL : http://en.wikipedia.org/wiki/Orbiter_(simulator)

Orbiter Wiki URL : http://www.orbiterwiki.org/wiki/Orbiter

Version 060929 Download URL : http://orbit.medphys.ucl.ac.uk/

Sourceforge Beta URL : http://sourceforge.net/projects/orbitervis/

Sourceforge Visualization URL : http://sourceforge.net/projects/orbitervis/files/

http://www.orbiterwiki.org/wiki/Orbiter_Visualisation_Project

The software package and its extensions and addons enjoy widespread public support :

Orbiter Wiki URL : http://www.orbiterwiki.org/

Orbiter Forum URL : http://orbiter-forum.com/

Orbiter Repository URL : http://www.orbithangar.com/

Orbiter Redirection URL : http://www.orbitersim.com/

Orbiter Forum Archive : http://www.orbitersim.com/Forum/default.aspx

Orbiter High Speed Downloads : http://downloadorbitersim.com/

Orbiter Space Flight Simulator is licensed under the GNU General Public License (GPL)

4th International Conference on Astrodynamics Tools and Techniques

Main Page : http://www.congrex.nl/10a08/ (contains four interesting tutorials)

Orbiter 2010 Press Release **:** http://orbit.medphys.ucl.ac.uk/press/orbiter2010.pdf

Orbiter 2010 News URL : http://orbit.medphys.ucl.ac.uk/news.php

Orbiter 2010 Release URL : http://orbit.medphys.ucl.ac.uk/home.php

Orbiter 2010 Download URL : http://orbit.medphys.ucl.ac.uk/download.php

• ***Section 4****: Numbered responses that correspond with their respective question listed below.*

Overview:

The Flight Dynamics Division at JSC uses trajectory software to execute various tasks spanning mission analysis, flight configuration, and real-time operations. These tasks are performed in an environment, which at times, is very dynamic and has very high processing demands. In addition, the actions taken by the user, or those they supply with information, have safety critical implications. The individuals using the trajectory software will in some cases work in an isolated environment and in other cases will work in a distributed multi-user environment. In order to understand how well suited the candidate software is for use in this context, we need to understand the design approaches employed by the software. NASA's desire is to get short responses that include what features the software has that address these concerns, or a short suggestion on how the software may be complemented to address these concerns.

The approach employed in this evaluation is based on concepts from the Software Engineering Institute at Carnegie Mellon, which developed approaches for evaluating how well suited a software system is for an environment based on several key quality attributes. The quality attributes to be addressed are the Availability/Reliability, Ability to Modify, Performance/Scalability, Security, Testability, and Usability of the candidate software when placed in our environment. This RFI is concerned about the architecture of the software suite and the elements of that architecture that address these concerns.

Some of the capabilities required to address the quality concerns expressed in the following list will not be provided directly by the trajectory software. In the cases where there is no direct support, the analysis should turn to how the software has been integrated with other components that do provide the required capabilities. For instance, the trajectory software may not provide a transactional database, but may support a database interface. Another example may be that the trajectory software may not directly support any messaging protocols, but provides an adaptor mechanism for accessing application data so it could be distributed through a messaging bus. So the intent of this analysis is to determine what elements of the trajectory software's design directly or indirectly enable us to address these quality concerns.

NASA is requesting information about the design approaches and technologies employed by the software as they relate to the following quality concerns:

Quality Concerns
Availability/Reliability
Ability to Modify
Performance/Scalability
Security
Testability
Usability

1. **RFI Response :**

Unfortunately you have asked no specific questions in regards to the software proposed by this RFI, and time limitations prevent the formulation of a proper analysis. However, the respondent may address these issues in an upcoming Broad Agency Announcement for Heavy Lift Propulsion Technology Trade Studies Solicitation: - NNM10ZDA001J.

http://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={912C7227-85A9-FBF5-7E43-574FF9C51734}&path=init

The software proposed is freeware and includes innumerable open source extensions.

No solicitation exists; therefore, do not request a copy of the solicitation.

Response Submission Deadline:

Responses to this RFI must be submitted no later than 11:59 PM Eastern Standard Time, on May 28, 2010. RFI submissions will be accepted as e-mail attachments only. All responses must be sent to john.r.carpentier@nasa.gov, with "Traj RFI Response" and NNJ10ZHD001L in the subject line. An e-mail confirmation of receipt from NASA will be sent within a one-week period to the designated point of contact.

Point of Contact for Inquiries and Submissions:

Inquiries/questions regarding this proposal may be directed to NASA Johnson Space Center, Attn: J.R. Carpentier, Mail Stop BH, 2101 NASA Parkway, Houston, TX, 77058, fax 281-483-4066, telephone 281-244-7254, or electronic mail at john.r.carpentier@nasa.gov with "Traj RFI Inquiry" and NNJ10ZHD001L in the subject line. Inquiries/questions must be received by May 26, 2010.

DISCLAIMER

NASA will not publicly disclose proprietary information obtained as a result of this RFI. To the full extent that it is protected by law and regulations, information identified by a respondent as Proprietary or Confidential will be kept confidential.

Point of Contact

Name: J. R. Carpentier
Title: Contracting Officer
Phone: 281-244-7254
Fax: 281-483-2138
Email: john.r.carpentier@nasa.gov