NASA SBIR 2009 Phase I Solicitation

O4.04   Flight Dynamics Technologies and Software

Lead Center: GRC

Participating Center(s): GSFC, JPL

NASA is beginning to invest in re-engineering its suite of tools and facilities that provide navigation and mission design services for design and operations of near-Earth and interplanetary missions. This solicitation seeks proposals that will develop flight dynamics technologies and software that support these efforts.

 In the context of this solicitation, flight dynamics technologies and software are algorithms and software that may be used in ground support facilities, or onboard a spacecraft, so as to provide Position, Navigation, and Timing (PNT) services that reduce the need for ground tracking and ground navigation support. Flight dynamics technologies and software also provide critical support to pre-flight mission design, planning, and analysis activities.

 This solicitation is primarily focused on NASA?s needs in the following focused areas:

- Applications of cutting-edge estimation techniques, such as sigma-point and particle filters, to spaceflight navigation problems.

- Applications of estimation techniques that have an expanded state vector (beyond position and velocity components) to monitor non-Gaussian noise processes to improve upon the overall system accuracy.

- Applications of creative estimation techniques that combine measurements from multiple sensor suites to improve upon the overall system accuracy.

- Applications of advanced dynamical theories to space mission design and analysis, especially in the context of unstable orbital trajectories in the vicinity of small bodies and libration points.

- Addition of novel measurement technologies to existing NASA onboard navigation software that is licensed by the proposer.

- Addition of orbit determination capabilities to existing NASA mission design software that is either freely available via NASA Open Source Agreements, or that is licensed by the proposer.

Proposals that leverage state-of-the-art capabilities already developed by NASA such as GPS-Enhanced Onboard Navigation Software (http://techtransfer.gsfc.nasa.gov/ft-tech-GEONS.html), General Mission Analysis Tool (http://sourceforge.net/projects/gmat/), GPS-Inferred Positioning System and Orbit Analysis Simulation Software, (http://gipsy.jpl.nasa.gov/orms/goa/), are especially encouraged. Proposers who contemplate licensing NASA technologies are highly encouraged to coordinate with the appropriate NASA technology transfer offices prior to submission of their proposals.

Technologies and software should support a broad range of spaceflight customers. Technologies and software specifically focused on a particular mission's or mission set's needs, for example rendezvous and docking, or formation flying, are the subject of other solicitations by the relevant sponsoring organizations and should not be submitted in response to this solicitation.

Research should be conducted to demonstrate technical feasibility during Phase 1, and show a path toward a Phase 2 demonstration of a software package that will be delivered to NASA for testing at the completion of the Phase 2 contract.

The proposer to this subtopic is advised that the products proposed may be included in a future small satellite flight opportunity. Please see the SMD Topic S4 on Small Satellites for details regarding those opportunities. If the proposer would like to have their proposal considered for flight in the small satellite program, the proposal should state such and recommend a pathway for that possibility.