



NASA SBIR 2009 Phase I Solicitation

S4.05 High Torque, Low Jitter Reaction Wheels or Control Moment Gyros

Lead Center: ARC

NASA is becoming increasingly interested in using small spacecraft to execute space missions where possible. Many of these missions will require low cost, high torque and low jitter reaction wheels or control moment gyros. Currently there are limited sources of these systems applicable for small spacecraft. Therefore, development of a family of reaction wheels with the appropriate characteristics for nano- and small spacecraft (5 to 100 kg spacecraft mass) with reduced lead times will result in significant benefits to a number of NASA programs and missions.

Proposals are sought for the development of reaction wheels and/or control moment gyros with the following performance parameters:

- Mass less than 2 kg
- Average power usage less than 5W
- Compatible with the Space Plug-and-Play Architecture (SPA) developed at AFRL (See <http://www.dukeworks.org>)
- Reaction wheels
 - Angular momentum capacity of 1 to 2 Nms
 - Torque capacity greater than 50mN-m
 - Speed range greater than $\hat{\pm}20000$ rpm
- Control Moment Gyros
 - Torques of 0.1 to 5 Nm

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- Induced jitter noise TBR:
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 - The use of built in control electronics with rate sensor abilities is also desirable
 - Rate sensor should have a range of 500 deg/sec
 - Drift rate 0.5 deg/hr

 - Stable over standard internal spacecraft bus operating temperatures of -25°C to 40°C
 - Radiation tolerant with Total Ionizing Dose (TID) of 10 - 400 kRad (Si) with an average goal of 100 kRad (Si)
 - Capable of surviving space launch environments

Although these are baseline goals, proposals that are able to achieve near comparable values will also be considered.

The proposer to this subtopic is advised that the products proposed may be included in a future small satellite flight opportunity.