NASA STTR 2014 Phase I Solicitation

T1.01 Affordable Nano-Launcher Upper Stage Propulsion

Lead Center: MSFC

Participating Center(s): GRC, KSC, LaRC

Small satellites are becoming ever more capable of performing valuable missions for both government and commercial customers. However, currently these satellites can only be launched affordably as secondary payloads. This makes it difficult for the sll satellite mission to launch when needed, to the desired orbit, and with acceptable risk. A dedicated launch vehicle is needed that will affordably meet the small sat launch needs. This subtopic solicits technology proposals for the upper stage propulsion system of such a launcher. Specifically, the subtopic requests proposals for propulsion design tools, systems, and stages for application as upper stages or orbit insertion stages with the following goals and constraints:

- A recurring stage cost not to exceed $100K (for 8/year).
- The stage shall be capable of providing at least 13,000 fps delta-v to a 150 lbm mass from in vacuum conditions.
- The stage shall be designed to a diameter of 3.0 ft or less.
- The stage shall be capable of compressively supporting 700 lbf on its forward end (in addition to its own loaded mass).
- Total stage wet mass shall not exceed 1800 lbm.
- Other desired functionality include TVC, basic health and status monitoring, and throttling.
- Design analysis techniques that provide rapid, high fidelity insight into the operation of these systems are also needed.

Technologies meeting these goals will support development of an affordable launcher capable of delivering 55 lbm to 100 lbm to low-earth orbit. Phase I activities will develop the data necessary to assert with confidence that the proposed technology solution will meet the goals of the subtopic. Phase II activities will provide functionality verification and substantiation of recurring cost.

Mission Traceability - STMD, HEOMD, and SMD all have missions that would benefit from this technology. In particular, STMD’s SST and GCD Programs have expressed a strong need.