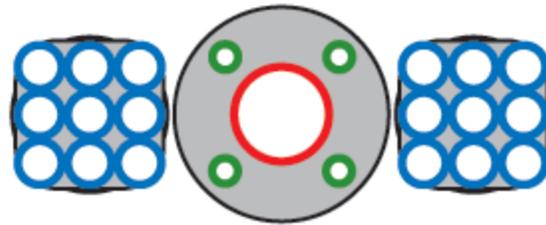


The Delta V Reusable Space Launch System

Thomas Lee Elifritz

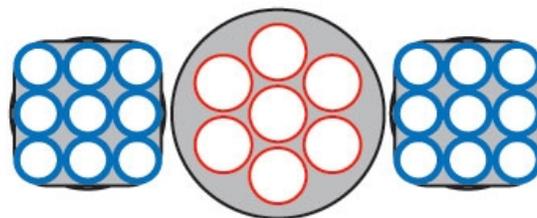
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**FALCON 9
DELTA V**

Nearly six years ago, in November of 2007, I presented a COTS-2 research proposal to NASA entitled: Commercial Orbital Space Transportation System, or COSTS, which consisted of an Ares I upper stage derived, 5.5 meter, hydrogen oxygen core stage powered by a single space shuttle main engine, SSME, and boosted off the pad by twin hydrocarbon liquid reusable boosters - anticipated, but not yet existing. Those long anticipated reusable hydrocarbon boosters do now exist, and should be flying by next week. Now is the time to review this launch vehicle design, in retrospect, as a NASA space launch system.

With nearly three million pounds of liftoff thrust, including the two SpaceX F9R reusable boosters and the ground started main engine, this vehicle is smaller but more capable than the space launch system. The more modern booster design provides new opportunities for revolutionary advances in engine and vehicle stage recovery and reuse, thermal and orbital debris protection, space station construction and deep space orbital transfers, as well as more fundamental issues such as mechanical stage clustering and staging, multi-vehicle engine control and guidance software, and sequential cross feed staging. Ideally, with new hydrogen engine offerings from Blue Origin, this vehicle would be lunar capable.



**BOOSTER ASSISTED
Hydrogen Cluster**

The beauty of this specific design is that it scales back up to SLS diameters easily, at much lower costs, thus making it attractive as a Constellation and/or Space Launch System program salvage replacement, which is what I originally proposed it for in my Augustine committee submission for President Obama. This design was not mentioned in his NASA space speech at Kennedy Space Center on April 15, 2010, and congress subsequently reversed that Constellation decision (except for Ares I), and then enforced that decision in subsequent NASA authorization and appropriations acts. Thus I propose it here again.