Hypersonic ReEntry Deployable Glider Experiment Critical Design

(Technical Report)

US and NATO Aid to Ukraine: How Much Is Too Much?

(STS Research Paper)

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by

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Preface

As strategic rivals in geopolitical competition, the Russian Federation and the United States strive for advantages in military technology and in international relations. Among the many manifestations of this rivalry are hypersonic weapons development and, more recently, US military support for Ukraine. In seeking strategic advantages in such competitions, both powers also strive to prevent dangerous destabilization.

Hypersonic weapons tests are expensive. The Hypersonic ReEntry Deployable Glider Experiment (HEDGE) may demonstrate the feasibility of CubeSats in low-cost, hypersonic deorbit and re-entry experiments. The HEDGE is a flight vehicle concept that can be launched as a CubeSat and reconfigure itself as a hypersonic flight vehicle upon re-entry into the atmosphere. The Attitude Determination and Control System/Orbit Determination team designed a Flush Air Data System in which differences in pressure can determine the glider's angle of attack and sideslip. The project team designed and prototyped a system of pressure ports so that future project teams may collect pressure data before the glider burns up in the atmosphere.

For over a year, NATO and Russia have followed a pattern of cautious, gradual escalation, in which each side characterizes the other's latest action as a dangerous escalation requiring a proportional response. Russia seeks to deter NATO escalations by characterizing them as dangerous provocations that risk direct war. Both sides strive to avoid escalations that are so provocative as to risk direct war between NATO and Russia; each side also strives to characterize its rival's actions as provocations and its own as mere responses.