

ANNEX 1  
BETWEEN  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
LANGLEY RESEARCH CENTER  
AND  
UNIVERSITY OF MARYLAND  
UNDER  
SPACE ACT UMBRELLA AGREEMENT NO. 37319  
FOR  
SUPPORT OF FLUID-THERMAL-STRUCTURE INTERACTIONS TESTING,  
PART 1, IN LARC-LAL HYPERSONIC BLOW-DOWN WIND TUNNELS

ARTICLE 1. PURPOSE

This Annex shall be for the purpose of collaboration with the partner to enhance NASA's Science, Technology and Engineering in Hypersonic Flight and Strategic Road Mapping activities. NASA and UMD recognize the criticality and need for technological maturation for the development of safe reusable hypersonic flight.

NASA and UMD are both interested in research and development activities associated with hypersonic technologies. UMD will provide subject matter experts in the area of fluid structure interactions in relation to unsteady fluid flow over control surfaces on a hypersonic vehicle. NASA and UMD will collaborate in the development of test techniques and conducting research on Hypersonic Fluid Thermal Structure Interactions (FTSI) in the Langley Aerothermodynamic Laboratory (LAL) Hypersonic Blow-Down Wind Tunnels. Data from any research, development and testing will be helpful to UMD in developing their experimental capabilities and valuable to the Hypersonic Technology Project to extend testing capabilities.

The legal authority for this Annex, consistent with the Umbrella Agreement, is in accordance with the Space Act, Other Transactions Authority (OTA), 51 U.S.C. § 20113(e).

ARTICLE 2. RESPONSIBILITIES

A. NASA LaRC will use reasonable efforts to:

1. Provide LAL Hypersonic Wind Tunnel Test Facilities, Model Fabrication, and Instrumentation.
2. Provide LaRC Principal Investigator (PI) support.
3. Operate test facility.
4. Provide facility and flow condition test data.
5. Collaborate to publish a data report.

B. Partner will use reasonable efforts to:

1. Provide test plan.
2. Provide PI Support (advisor, student(s)).
3. Provide Model, Modifications, Instrumentation, and Data Acquisition.
4. Assist with wind tunnel test.
5. Perform Post-test Analysis.
6. Collaborate to publish a data report.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities for this Annex defined in the "Responsibilities" Article are as follows:

1. Partner shall provide test plans to NASA LaRC.	Two (2) weeks prior to testing.
2. NASA LaRC will provide access to the LAL 20" Mach 6 Test Facility for testing at higher Reynolds numbers.	No later than March 31, 2024.
3. NASA LaRC will provide access to the LAL 31" Mach 10 Test Facility for testing at higher Temperatures.	No later than July 31, 2024.
4. NASA and Partner will identify and provide Principal Investigator technical support.	Throughout term of the Agreement.
5. Partner shall provide model, modifications, instrumentation, and data acquisition.	Two (2) weeks prior to testing.
6. NASA LaRC and Partner will conduct testing in LAL 20" Mach 6 Test Facility for 80 hours occupancy and 40 hours operation.	No later than April 15, 2024.
7. NASA LaRC and Partner will conduct testing in LAL 31" Mach 10 Test Facility for 56 hours occupancy and 16 hours operation.	No later than August 15, 2024.
8. NASA LaRC will deliver facility and flow condition test data.	One (1) week following test completion.
9. Partner shall begin performing final post test data analyses.	Two (2) weeks following test completion.
10. NASA LaRC and Partner will publish data report.	No later than January 31, 2025.

#### ARTICLE 4. FINANCIAL OBLIGATIONS

There will be no transfer of funds between the Parties under this Agreement and each Party will fund its own participation. All activities under or pursuant to this Agreement are subject to the availability of funds, and no provision of this Agreement shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, (31 U.S.C. § 1341).

#### ARTICLE 5. INTELLECTUAL PROPERTY RIGHTS - DATA RIGHTS

A. Data produced under this Annex which is subject to paragraph C. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement will be protected for the period of one year.

B. Under paragraph H. of the Intellectual Property Rights - Data Rights Article of the Umbrella Agreement, Disclosing Party provides the following Data to Receiving Party. The lists below may not be comprehensive, are subject to change, and do not supersede any restrictive notice on the Data provided.

1. Background Data:

The Disclosing Party's Background Data, if any, will be identified in a separate technical document.

2. Third Party Proprietary Data:

The Disclosing Party's Third Party Proprietary Data, if any, will be identified in a separate technical document.

3. Controlled Government Data:

The Disclosing Party's Controlled Government Data, if any, will be identified in a separate technical document.

4. The following software and related Data will be provided to Partner under a separate Software Usage Agreement:

None

#### ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below ("Effective Date") and shall remain in effect until the completion of all obligations of both Parties hereto, or two years from the Effective Date, whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. The term of this Annex shall not exceed the term of the Umbrella Agreement. The Annex automatically expires upon the expiration of the Umbrella Agreement.

#### ARTICLE 7. RIGHT TO TERMINATE

Either Party may unilaterally terminate this Annex by providing thirty (30) calendar days written notice to the other Party.

## ARTICLE 8. POINTS OF CONTACT

The following personnel are designated as the Points of Contact between the Parties in the performance of this Annex.

### Management Points of Contact

NASA Langley Research Center  
Jennifer Hubble Viudez  
Center Agreements Manager  
Mail Stop: 254  
Langley Research Center  
Hampton, VA 23681  
Phone: (757) 864-5627  
jennifer.m.hubble@nasa.gov

UNIVERSITY OF MARYLAND  
Otto Fandino  
Director of Administration  
3400 A.V. Williams Building  
College Park, MD 207423281  
Phone: (301) 405-1134  
ottof@umd.edu

### Technical Points of Contact

NASA Langley Research Center  
Gregory Buck  
Aerospace Technologist  
Mail Stop: 408A  
Langley Research Center  
Hampton, VA 23681  
Phone: (757) 864-5240  
g.m.buck@nasa.gov

UNIVERSITY OF MARYLAND  
Stuart Laurence  
Professor, University of Maryland  
3184 Glenn L. Martin Hall  
College Park, MD 20742  
Phone: (301) 405-2422  
stuartl@umd.edu

## ARTICLE 9. MODIFICATIONS

Any modification to this Annex shall be executed, in writing, and signed by an authorized representative of NASA and the Partner. Modification of an Annex does not modify the terms of the Umbrella Agreement.

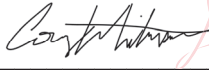
ARTICLE 10. SIGNATORY AUTHORITY

The signatories to this Annex covenant and warrant that they have authority to execute this Annex. By signing below, the undersigned agrees to the above terms and conditions.

NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION  
LANGLEY RESEARCH CENTER

UNIVERSITY OF MARYLAND

BY: \_\_\_\_\_  
John H. Koelling  
Director, Aeronautics Research  
Directorate

BY:  \_\_\_\_\_  
Cory M. Whitman  
Contract Manager, ORA

Digitally signed by Cory M. Whitman  
Date: 2024.02.12 11:56:22 -05'00'

DATE: \_\_\_\_\_

DATE: 2/12/2024