Hypersonic Propulsion Control

Hardware Testing

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System Identification Experiments
Hardware Testing
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System Identification Experiments
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- Controller
- LSFP Bypass Doors
- Diffuser Pressure
- Normal Shock Location
- Throat Pressure Ratio
- Desired Throat Pressure Ratio
- Inlet Characterization
System Identification Experiments

Note: 40% porosity normal hole bleed. Diameter = 0.125”
System Identification Experiment

Bleed plenum volume (m³)
- 0.0184 (small)
- 0.4020 (large)

Large volume
Small volume

Example of a sinusoidal stimulating signal with frequency linearly ranging from 0.0 Hz to 0.2 Hz over a 100 second span.
Mode Transition Experiment

Simultaneous control of all actuators:
- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

M = 0.
Mode Transition Experiment

Simultaneous control of all actuators:

- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

\( M = 2. \)
Simultaneous control of all actuators:

- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

M = 3.
Simultaneous control of all actuators:

- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

M = 4.
Mode Transition Experiment

Simultaneous control of all actuators:
- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

Mode transition at M = 4.
Mode Transition Experiment

Simultaneous control of all actuators:

- HS Cowl
- Splitter
- Ramp
- Bypass Valves 1-4
- HS Cold Pipe Plug
- LS Cold Pipe Plug

M = 4, low-speed inlet closed.
System Identification Experiments
System Identification Experiments

MATLAB Simulink Model

Host PC

Graphical User Interface

TCP-IP

Instrumentation Rack with Target PC

L-IMX

Mach 7

MATLAB Simulink

Model

TCP-IP

Graphical User Interface
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