HIGH-SPEED FSI DATABASE– CASE: 06-2020 v1

Hosted by UNSW Canberra

Name of Unit Case: NCSU/Duke U Impinging SBLI Over Elastic Panel

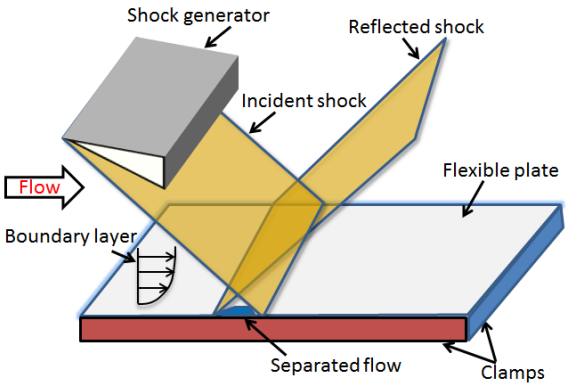
General Labels

Institution:	North Carolina State University, Duke University
Sponsor:	Air Force Office of Scientific Research
Flow Regime:	Supersonic
Compliant model:	Stainless steel panel clamped on all sides
Principal Physics:	Impinging SBLI over panel
FSI or FTSI:	FSI

General Details

Model Configuration:	Impinging SBLI, multiple shock generator angles, separated and unseparated SBLI, panel and rigid plate comparison Mach 2.5, two cavity pressure settings beneath the panel (1 atm and freestream pressure)
Experiment Description:	Roving hammer test characterization of the panel modes with measured pre-stress (used in wind tunnel experiment) and without pre-stress, Mean surface streakline patterns, mean panel surface pressure, 8 kHz panel surface pressure imaging, simultaneous velocity (2D,2C), panel surface pressure and center-span deflection at 10 Hz over SBLI
SBLI?	Yes
Thermal Effects?	No

Sketch/Technical Drawings of Model



Experiment Details

Compliant surface material:	303 Stainless steel
Other geometric details:	13-inX3-inX1mm panel, clamped on all sides
Facility:	Mach 1.5 – 4.0 supersonic blowdown wind tunnel, 10 sec run time

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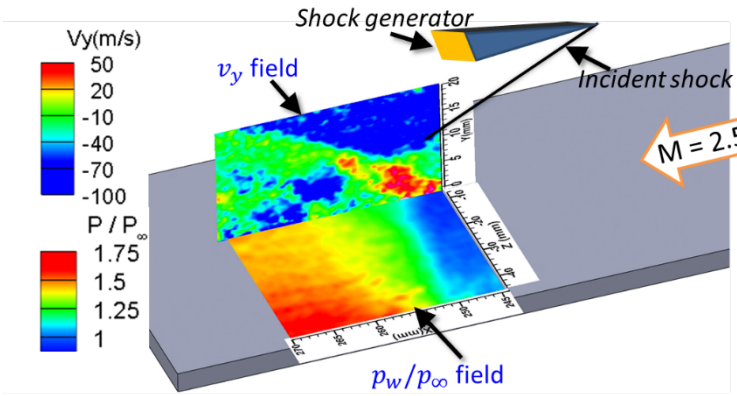
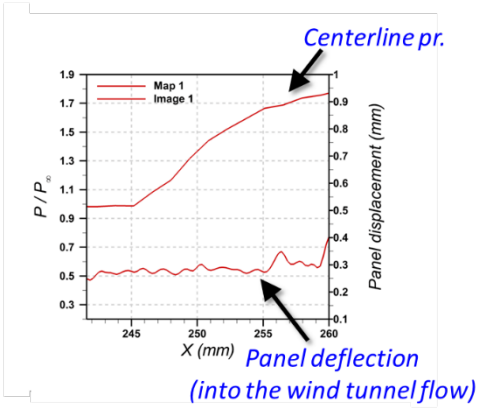
Mach number:	2.5
Test gas:	Air
Test flow characterisation:	Velocity measurement along mid span and mid height of test section, incoming boundary layer profiles with multiple redundant measurements
Total pressure [kPa]:	550 kPa
Total temperature [K]:	300 K
Freestream pressure [Pa]:	32.5 kPa
Freestream temperature [K]:	130 K
Model wall temperature [K]:	Not measured (but expect to be around 300 K)
Unit Reynolds number:	30 million per meter
Flow duration [s]:	10 sec
Test flow (ducted or free jet):	Ducted
Flow starting:	Gradual turning of pressure valve
Model insertion:	Pre inserted before test run
Data sets:	Available for Mach 2.5, cavity pressure of 1 atm

Example Data





Publications and contact info

Publications:	Varigonda SV, Narayanaswamy V, Boxx I (2020) Simultaneous Measurement of Pressure and Velocity Fields of an Oblique SBLI on a Flexible Panel using PIV and PSP. In AIAA AVIATION 2020 FORUM (p. 3001).
Date Experiment performed	Jan to March 2020
Date Entered:	6/11/2020
Entered by:	Venkat Narayanaswamy
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Other notes: