HIGH-SPEED FSI DATABASE – CASE: 02-2020 v1

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Name of Unit Case: Shock on a Cantilevered Plate

General Labels

Institution:	UNSW Canberra, USQ
Sponsor:	Air Force Office of Scientific Research (FA2386-16-1-4024)
Flow Regime:	Hypersonic (M5.8)
Compliant model:	Cantilever
Principal Physics:	SWBLI
FSI or FTSI:	FSI

General Details

Model Configuration:	Cantilevered, trailing-edge, compliant plate, AOA = 0°, 10° shock deflection angle
Experiment Description:	A low aspect-ratio cantilevered panel oscillates upon shock impingement
SBLI?	Yes
Thermal Effects?	No

Sketch/Technical Drawings of Model

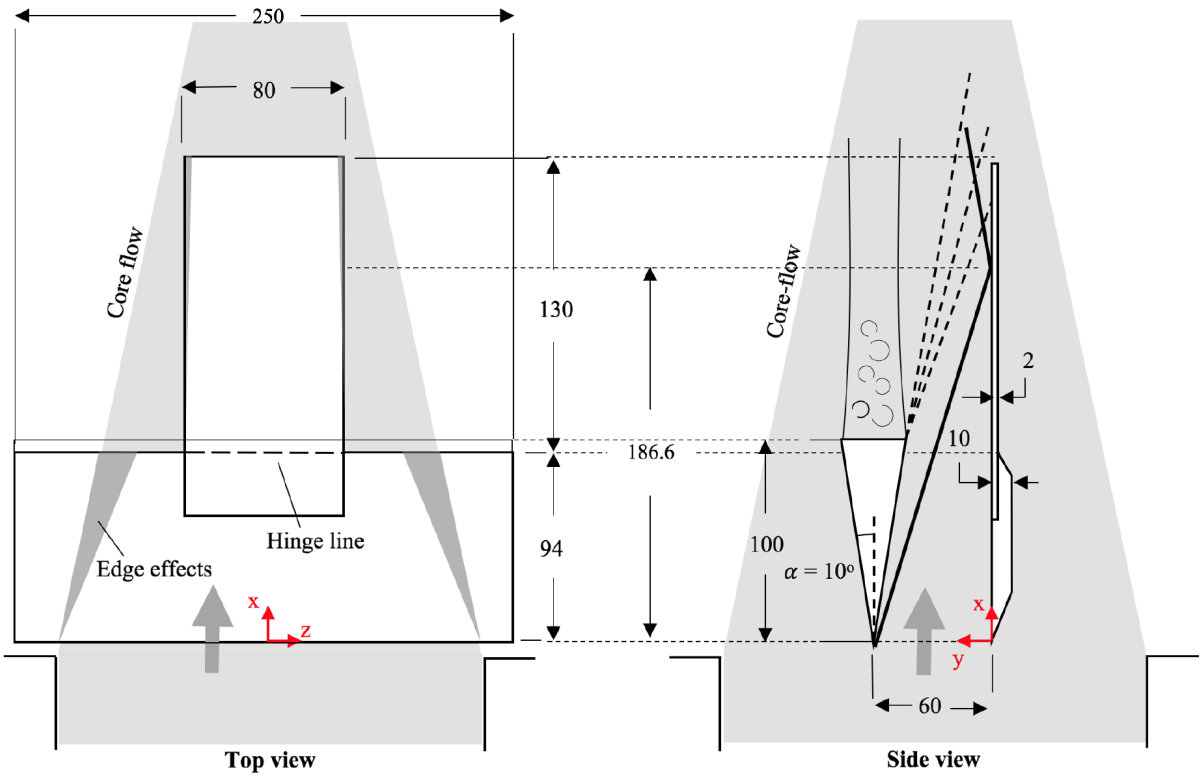

Fig. 2 Schematic of model setup in test section: top and side views. Arrows indicate directions of Mach 5.8 flow.

Experiment Details

Compliant surface material:	Aluminium AL-6061-T6
Other geometric details:	AoA of 0 deg to freestream
Facility:	TUSQ - compression heated Ludwieg tube at the University of Southern Queensland
Mach number:	5.8
Test gas:	compression heated air
Test flow characterisation:	calculated from stagnation pressure history in nozzle reservoir + nozzle area ratio with viscous correction
Total pressure [kPa]:	1000
Total temperature [K]:	580
Freestream pressure [Pa]:	750
Freestream temperature [K]:	75
Model wall temperature [K]:	300
Unit Reynolds number:	7160000
Flow duration [s]:	0.2
Test flow (ducted or free jet):	Free-jet
Flow starting:	diaphragm burst at nozzle throat to start nozzle
Model insertion:	Model in situ
Data sets:	PSP pressure distribution history, high-speed schlieren video history (flow field structure), high-speed schlieren video history (displacement), Pressure histories from 1 discrete sensor

Example Data

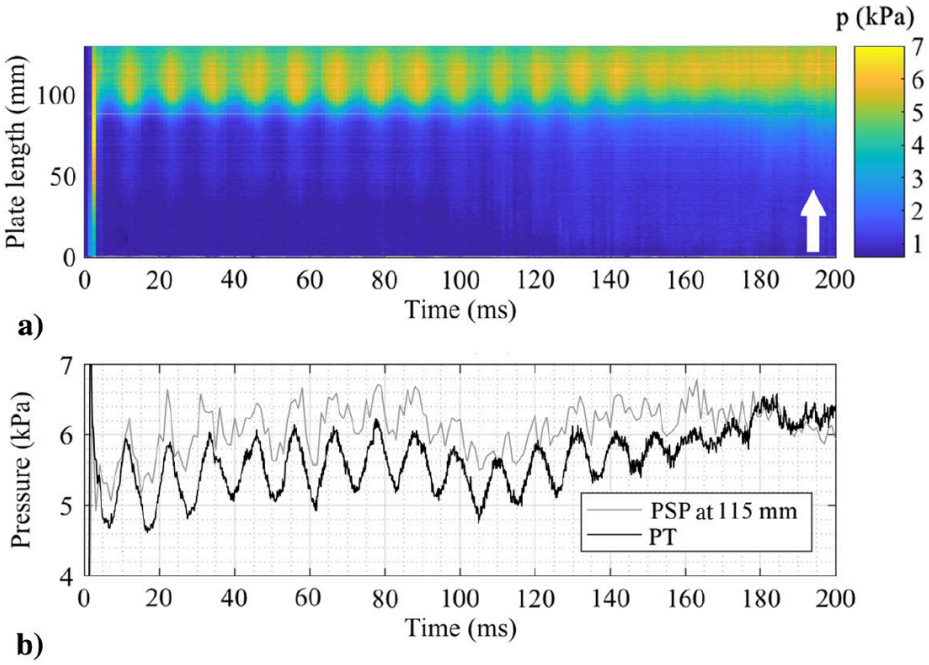

Fig. 6 Pressure measurements taken on oscillating plate during test: a) PSP streaking, and b) comparison between PSP and pressure transducer measurements at 115 mm from hinge line.

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Publications and Contact Info

Publications:	Currao GMD, Neely AJ, Kennell CM, Gai SL, Buttsworth DR (2019) Hypersonic Fluid–Structure Interaction on a Cantilevered Plate with Shock Impingement, *AIAA Journal*, Vol 57, No 11, DOI: 10.2514/1.J058375
Date Experiment performed	2017
Date Entered:	May-19
Entered by:	Gaetano Currao
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Other notes: