

**Name of Unit Case:** Oscillating Shock-Generator on a Rigid Plate

### General Labels

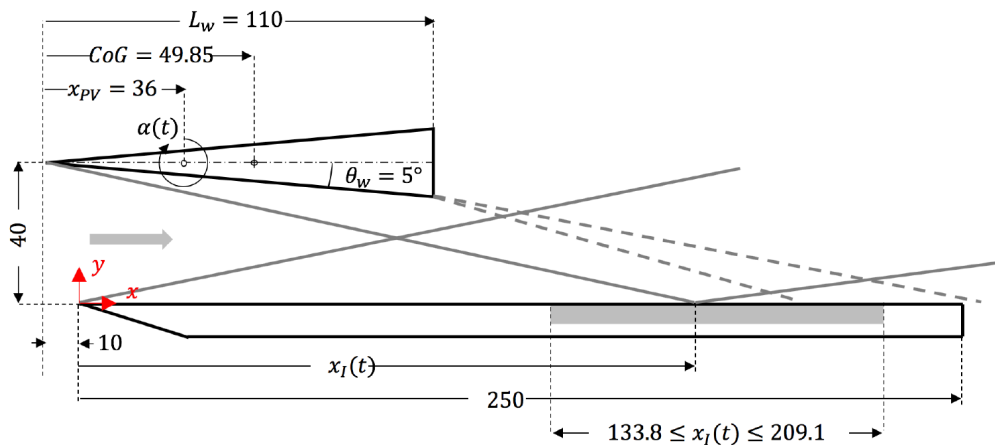
<b>Institution:</b>	UNSW Canberra, USQ, OSU, UQ
<b>Sponsor:</b>	Australian Research Council (DP180103480)
<b>Flow Regime:</b>	Hypersonic (M5.8)
<b>Compliant model:</b>	-
<b>Principal Physics:</b>	General
<b>FSI or FTSI:</b>	FSI



### General Details

<b>Model Configuration:</b>	Oscillating shock-generator
<b>Experiment Description:</b>	A wedge is freely oscillating in the flow causing a moving shock impinging on a flat plate
<b>SBLI?</b>	Yes
<b>Thermal Effects?</b>	No

### Sketch/Technical Drawings of Model

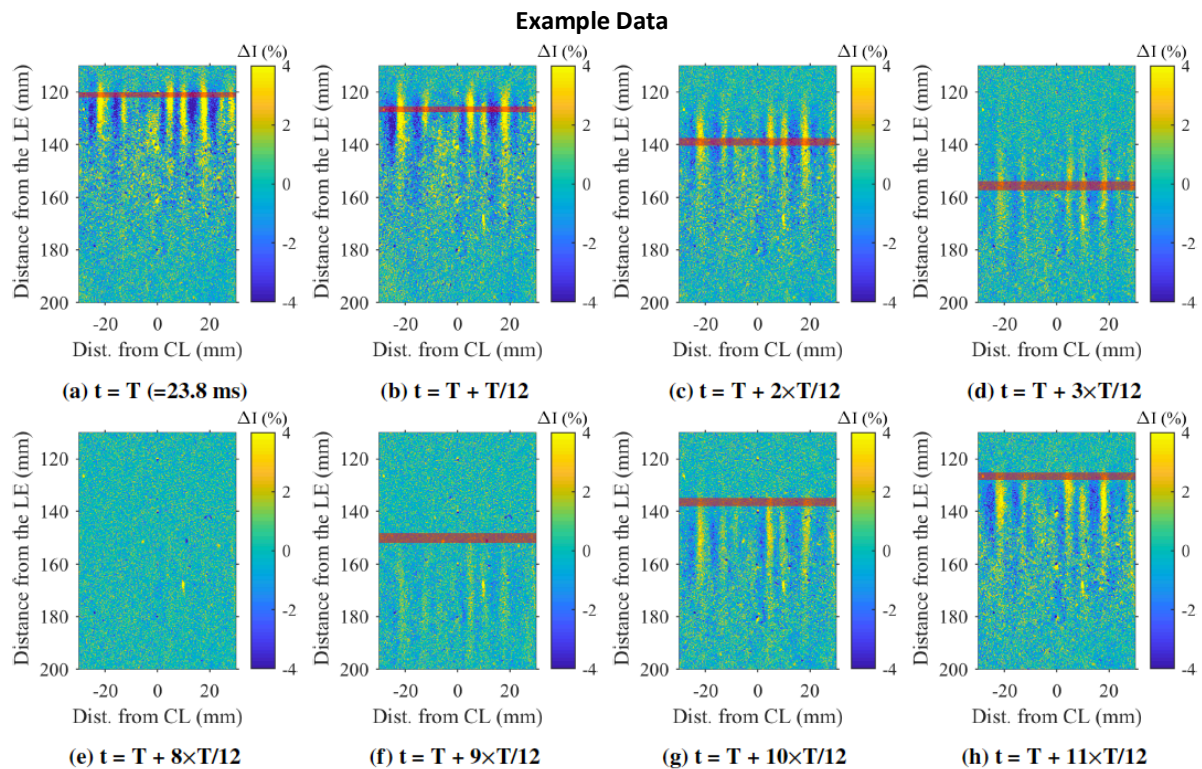


**Fig. 4** Schematic of the experimental set up. The full and dashed grey lines represent shocks and rarefaction waves respectively. The shaded area on the plate represent the extent of the region swept by the oscillating impinging shock (dimensions in mm).

### Experiment Details

<b>Compliant surface material:</b>	-
<b>Other geometric details:</b>	Refer to Fig. 4
<b>Facility:</b>	TUSQ - compression heated Ludwig tube at the University of Southern Queensland
<b>Mach number:</b>	5.8

<b>Test gas:</b>	compression heated air
<b>Test flow characterisation:</b>	calculated from stagnation pressure history in nozzle reservoir + nozzle area ratio with viscous correction
<b>Total pressure [kPa]:</b>	1000
<b>Total temperature [K]:</b>	580
<b>Freestream pressure [Pa]:</b>	775
<b>Freestream temperature [K]:</b>	75
<b>Model wall temperature [K]:</b>	300
<b>Unit Reynolds number:</b>	7160000
<b>Flow duration [s]:</b>	0.2
<b>Test flow (ducted or free jet):</b>	Free-jet
<b>Flow starting:</b>	diaphragm burst at nozzle throat to start nozzle
<b>Model insertion:</b>	Model in situ
<b>Data sets:</b>	PSP pressure history, high-speed schlieren video history (flow field structure), high-speed schlieren video history (displacement), Pressure histories from 8 discrete sensor



**Fig. 22** PSP measurements highlighting the effect of the Görtler-like vortices in the midspan region: variations in PSP intensity with respect to spanwise mean-trend ( $T = 23.8 \text{ ms}$ ). The red region indicates the uncertainty in the computed reattachment line (assuming a laminar flow).

### Publications and contact info

**Publications:** Currao GMD *et al.* (2020) Oscillating Shock Impinging on a Flat Plate at Mach 6, updated for *AIAA Journal* (under review)

# HIGH-SPEED FSI DATABASE– CASE: 04-2020 v1

Hosted by UNSW Canberra

Currao GMD, McQuellin LP, Neely AJ, Zander F, Buttsworth DR,  
McNamara JJ, Jahn I (2019) Oscillating Shock Impinging on a Flat Plate at  
Mach 6, AIAA-2019-3077, AIAA Aviation Forum

**Date Experiment performed** 2019  
**Date Entered:** May-20  
**Entered by:** Gaetano Currao  
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**Other notes:**