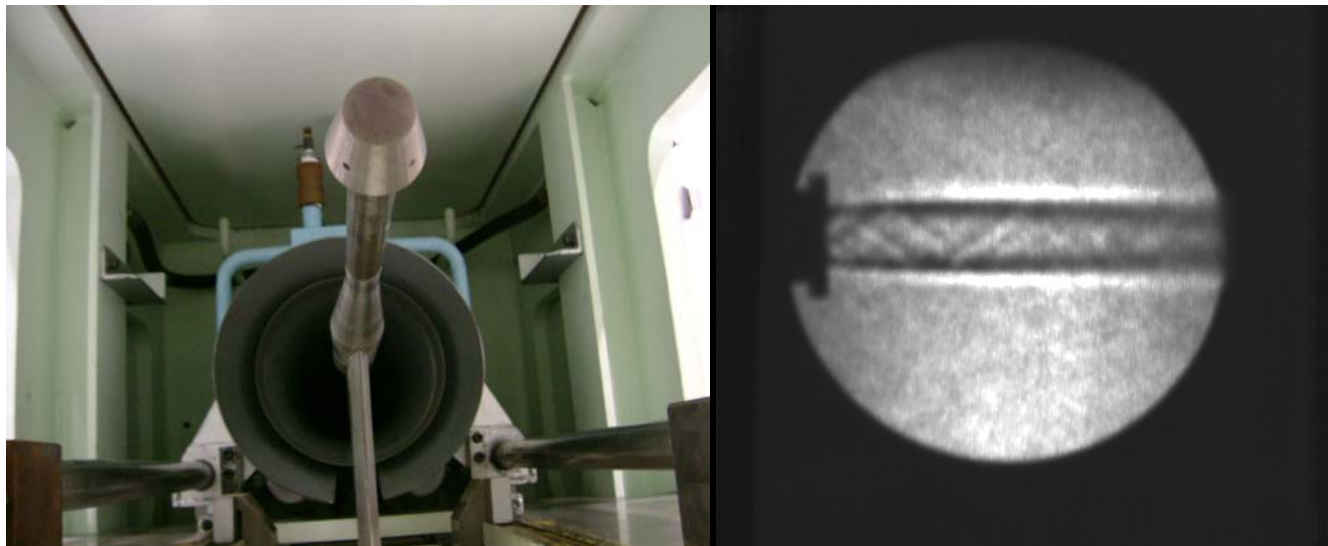




# Introduction of Hypersonic Wind Tunnel at UT Kashiwa Campus

[http://daedalus.k.u-tokyo.ac.jp/wt/wt\\_index.htm](http://daedalus.k.u-tokyo.ac.jp/wt/wt_index.htm) (in Japanese)



Kojiro Suzuki, Kashiwa Wind Tunnel Working Group,  
University of Tokyo, JAPAN

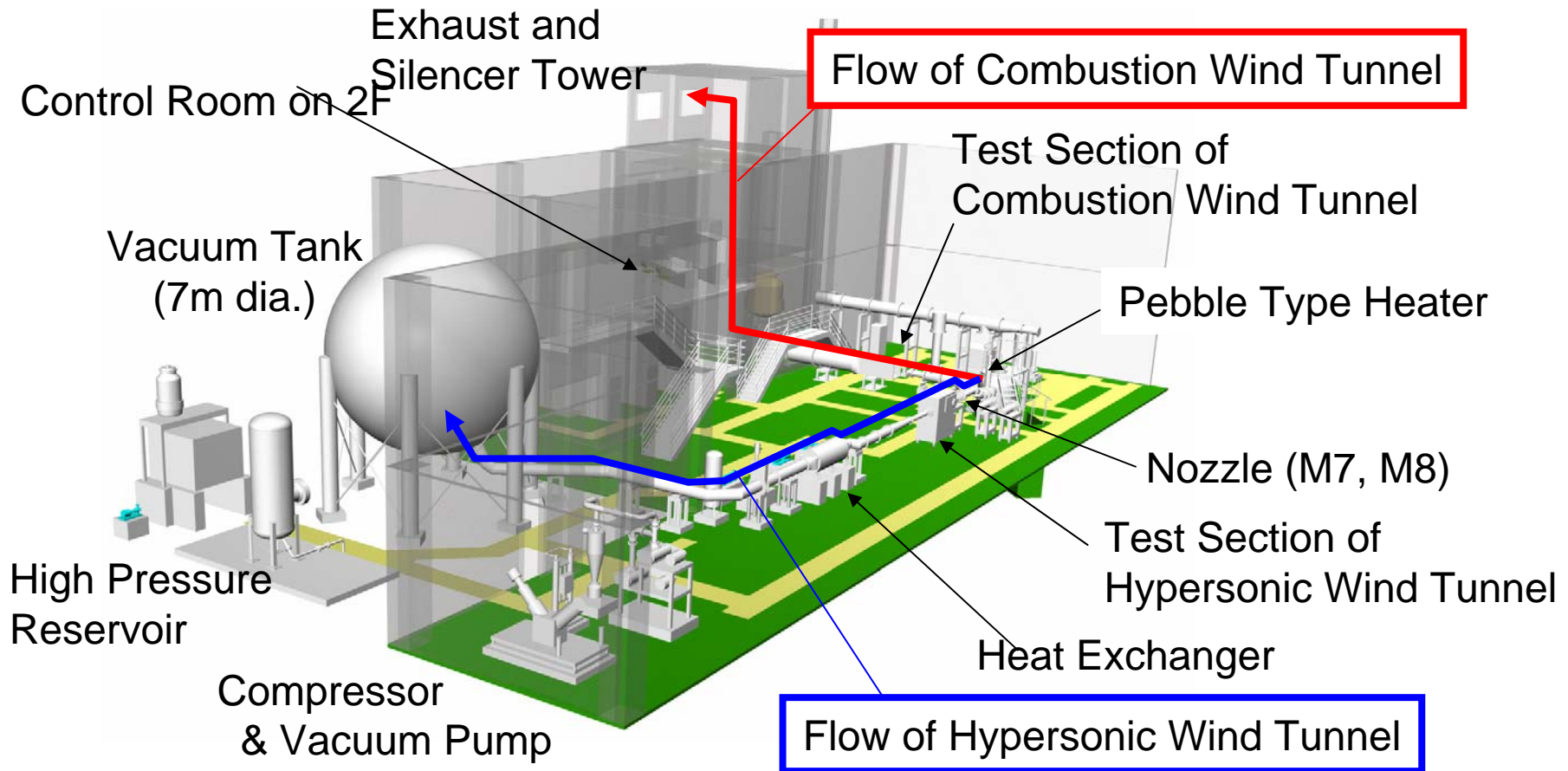
E-mail : [kfudo@daedalus.k.u-tokyo.ac.jp](mailto:kfudo@daedalus.k.u-tokyo.ac.jp)





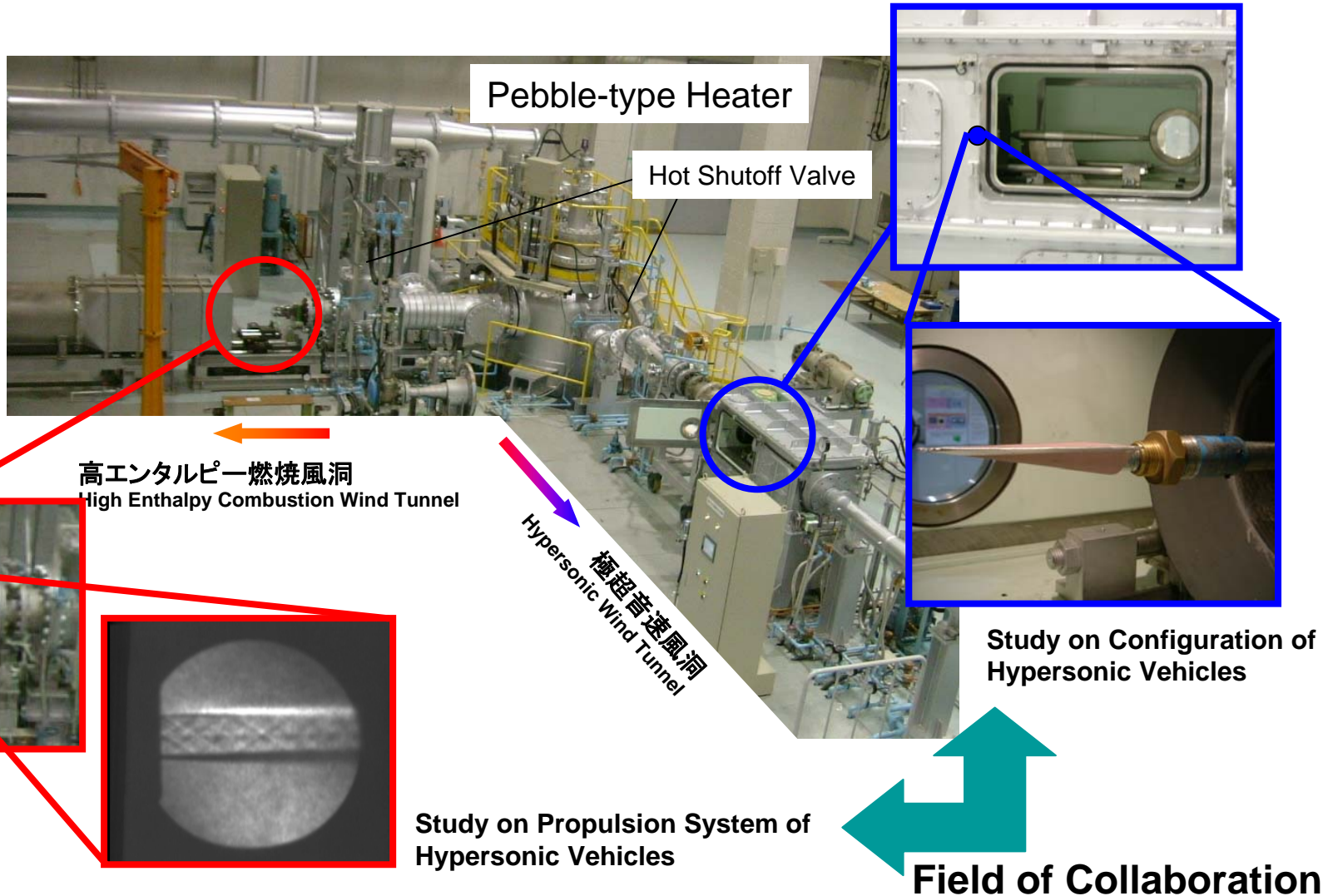
# Hypersonic and High Enthalpy Wind Tunnel at UT Kashiwa Campus

- Operation Started in Jan. 2007
- Two Operation Modes with One Heater,
- Relatively Low Stagnation Pressure (< 1 MPa)





# “Two” Operation Modes with “One” Heater





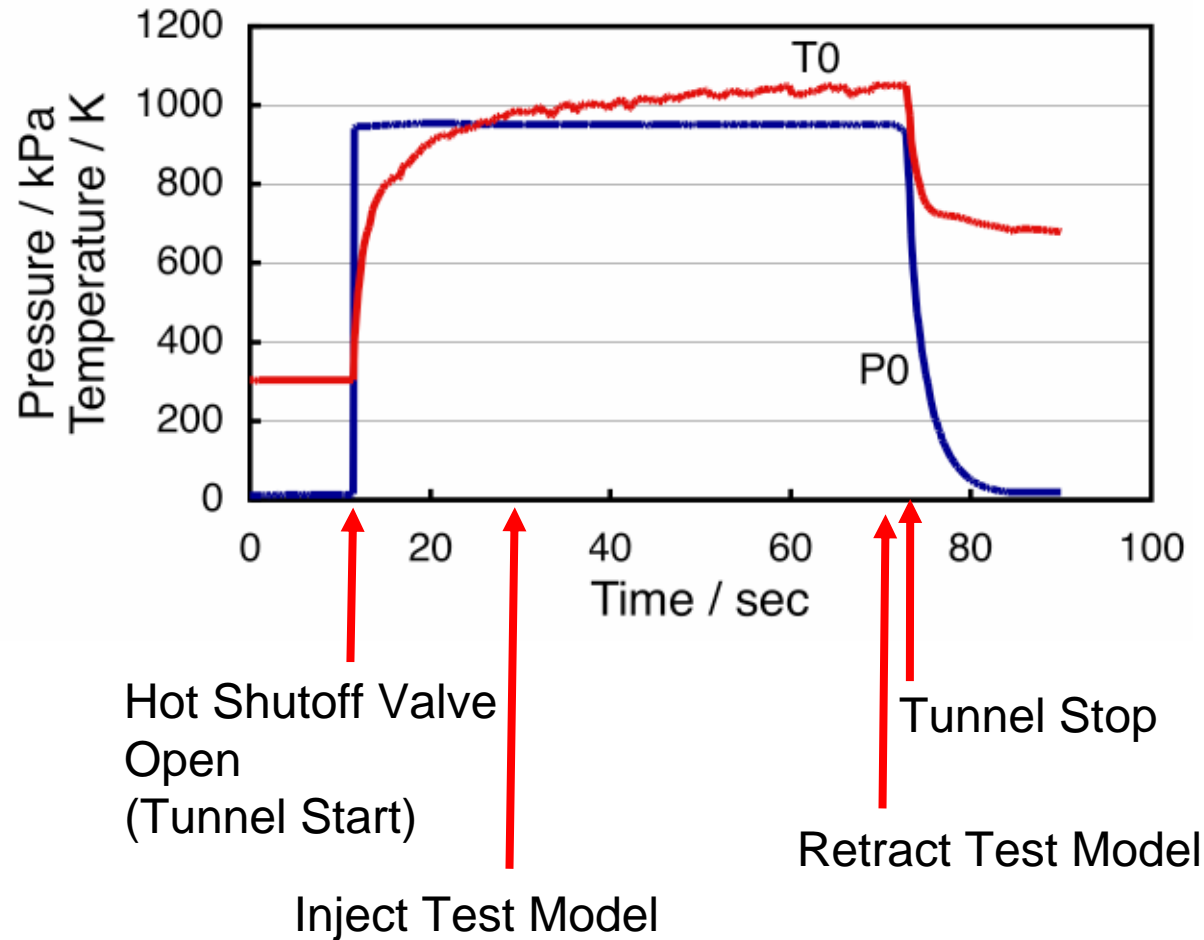

## SPECIFICATIONS

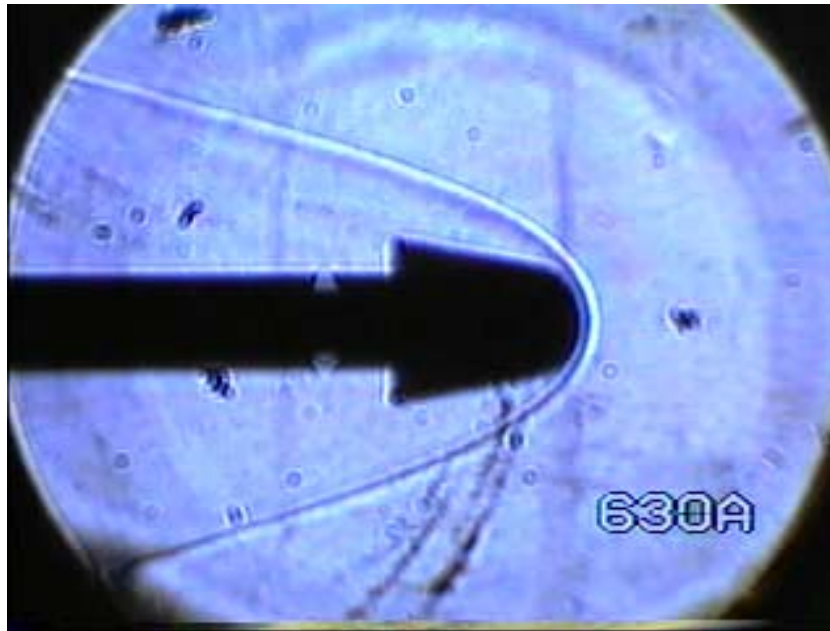
|                        | Hypersonic WT                               | Combustion WT                      |
|------------------------|---|------------------------------------|
| Mach Number            | 7, 8  | Depend on users                    |
| Nozzle Exit            | 200mm dia.<br>Uniform Flow Core 120 mm dia. | Depend on users                    |
| Stagnation Pressure    | Max. 0.95 MPa                               | Max. 0.7 MPa                       |
| Stagnation Temperature | Max. 1000 K                                 | Max. 1000 degC                     |
| Unit Reynolds No.      | 1 ~ 2 X10 <sup>4</sup> (1/cm)               | —                                  |
| Mass Flow Rate         | Max. 0.39kg/s                               | Max. 1kg/s                         |
| Test Duration          | 60 sec                                      | 100 sec (or more)                  |
| Reservoir              | 5MPa(G), 4m <sup>3</sup> (X1)               |                                    |
| Heater                 | Pebble Type + City Gas Burner               |                                    |
| Exhaust                | Vacuum Tank (7m dia.)                       | Open to Atmosphere<br>via Silencer |





# Typical Operation Sequence at Hypersonic Wind Tunnel





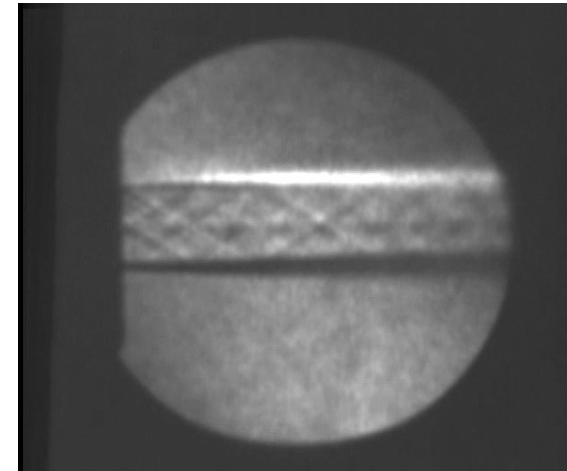
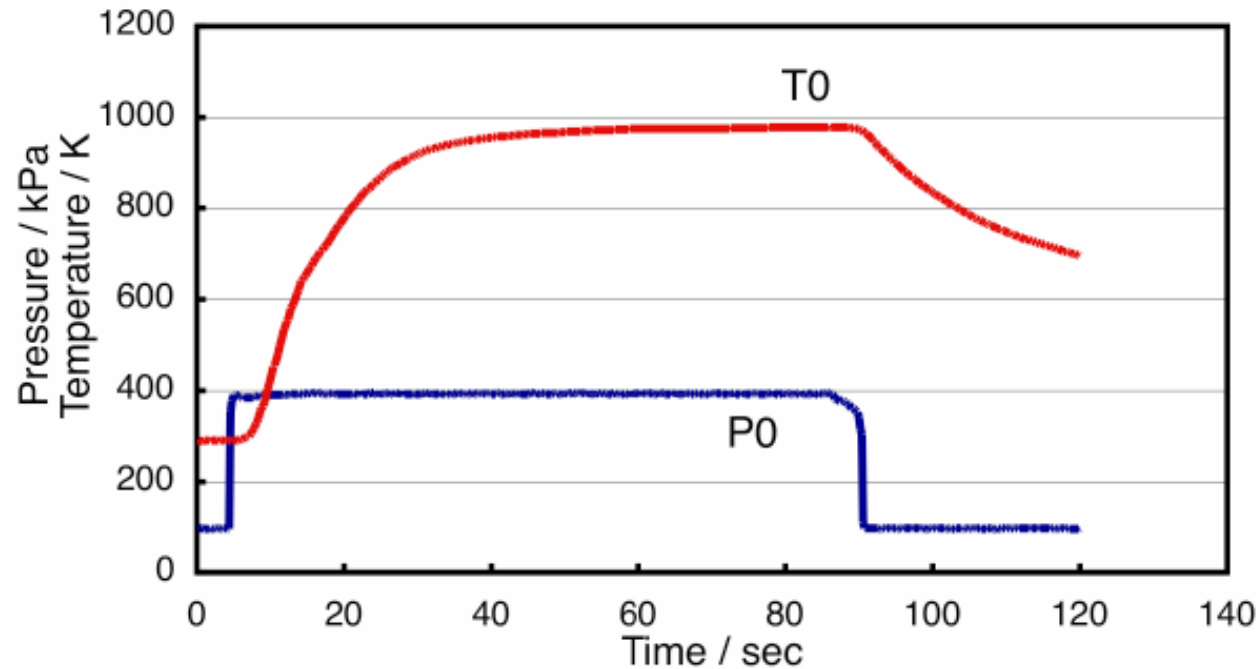
Mach 7 Flow

- Model is injected after the steady hypersonic flow has been obtained.
- Pitch Motion Control (-10 deg ~ 10 deg). Model is retracted before the tunnel stops.
- Very Smooth Flow Start, Very Quiet Operation.
- Maximum Blockage Ratio ~ 5 % (Max. dia 4~5cm in case of hemisphere)
- Relatively Long Test Duration (Max. 60 sec)
- Relatively Short Startup Time (1st Blow 3 hrs after “Switch ON”)
- Short Turn-around Time ( 1 Blow / Hour )





# Typical Operation Sequence at Combustion Wind Tunnel



Schlieren Picture of  
 Jet from M1.8 Nozzle  
 (Cold Flow Test)  
 \*Hydrogen Combustion under study



- 
1. Open to Hypersonic Research/Education Projects
  2. Field of Collaboration for Vehicle Community and Propulsion Community
  3. Highly Frequent Operation (1blow/hour, 10blows/day)  
-> Parametric Study, Studies on Innovative Concepts

