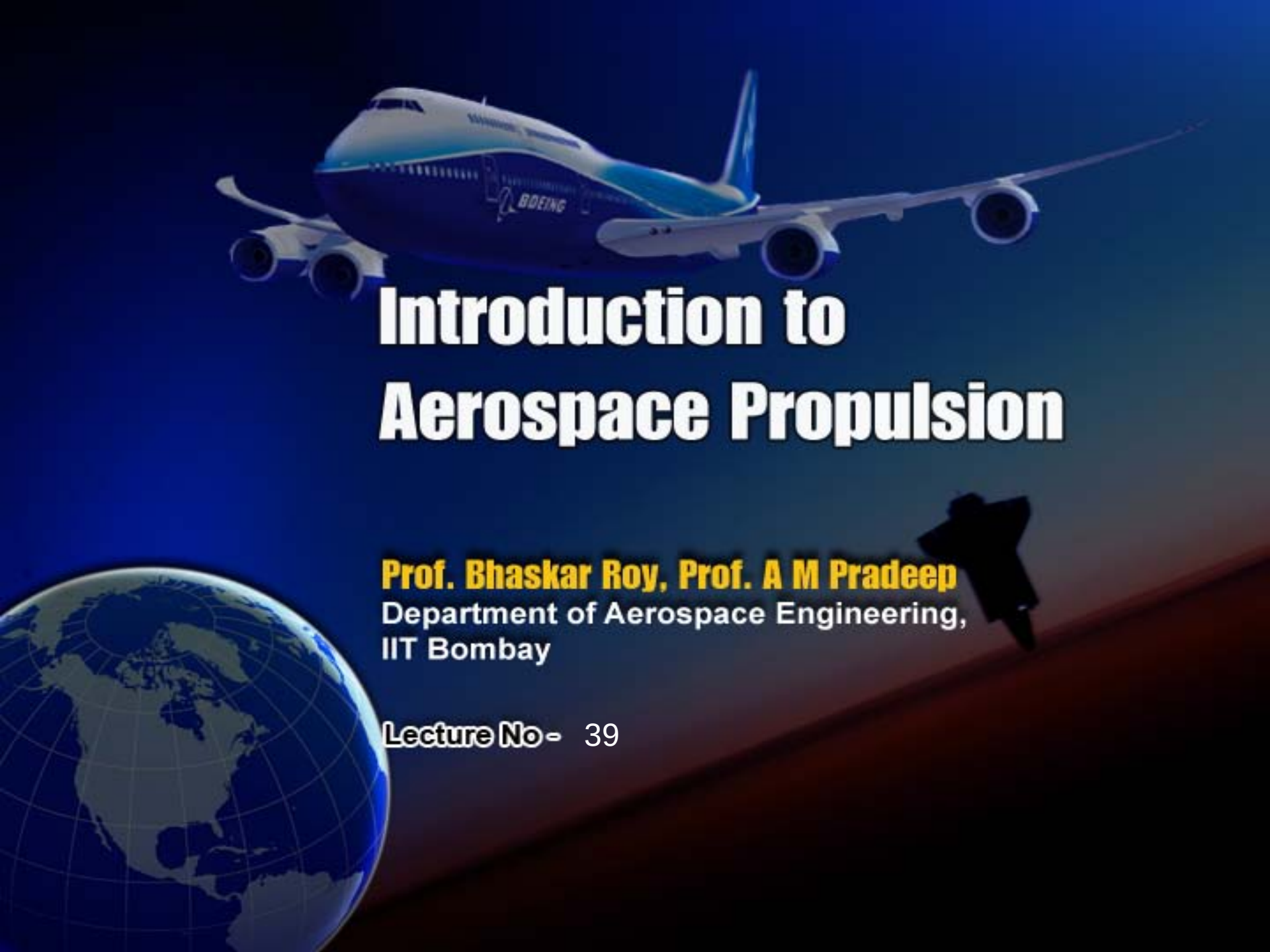

Introduction to Aerospace Propulsion

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Department of Aerospace Engineering,
IIT Bombay

Lecture No - 39

A glimpse into the future of Aerospace Propulsion

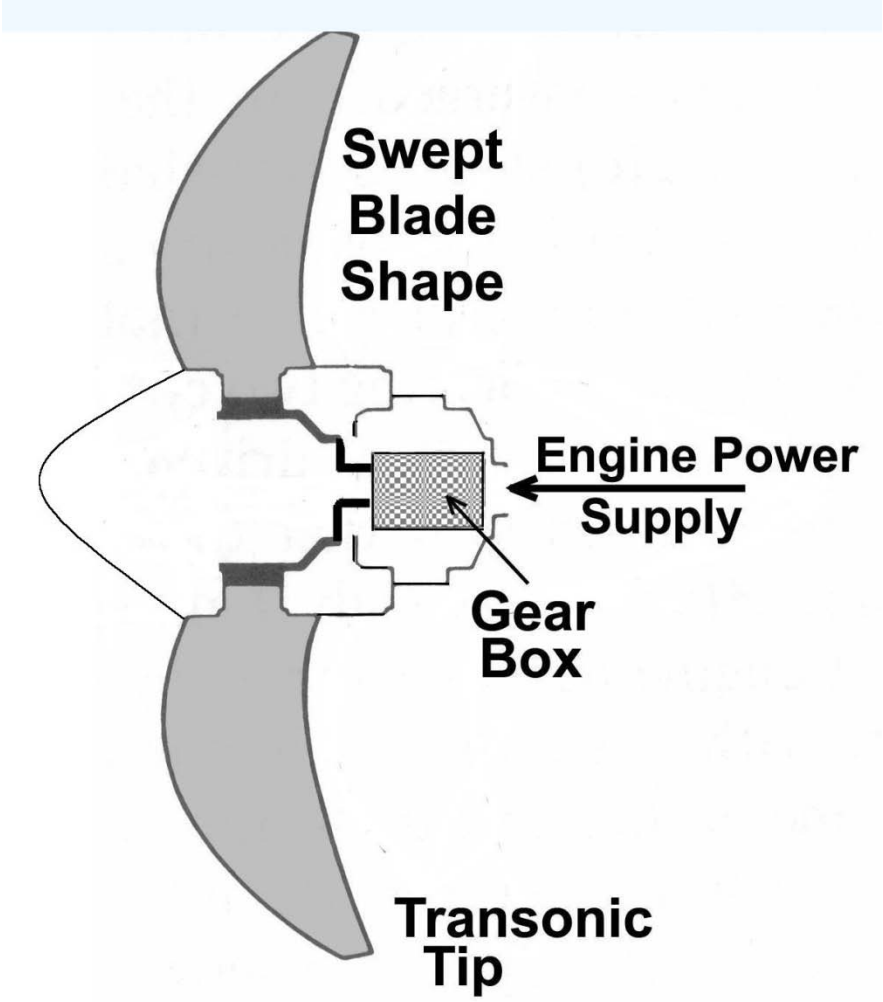
Prof. Bhaskar Roy, Prof. A M Pradeep, Department of Aerospace, IIT Bombay

A Diesel engine powered propeller for aircraft

Diesel engines are CI engines and are too heavy for aircraft. But, modern light & strong materials are used for developing new aircraft–worthy diesel engines

Small
Gas turbine
powered
propeller
engines –
Turbo-props

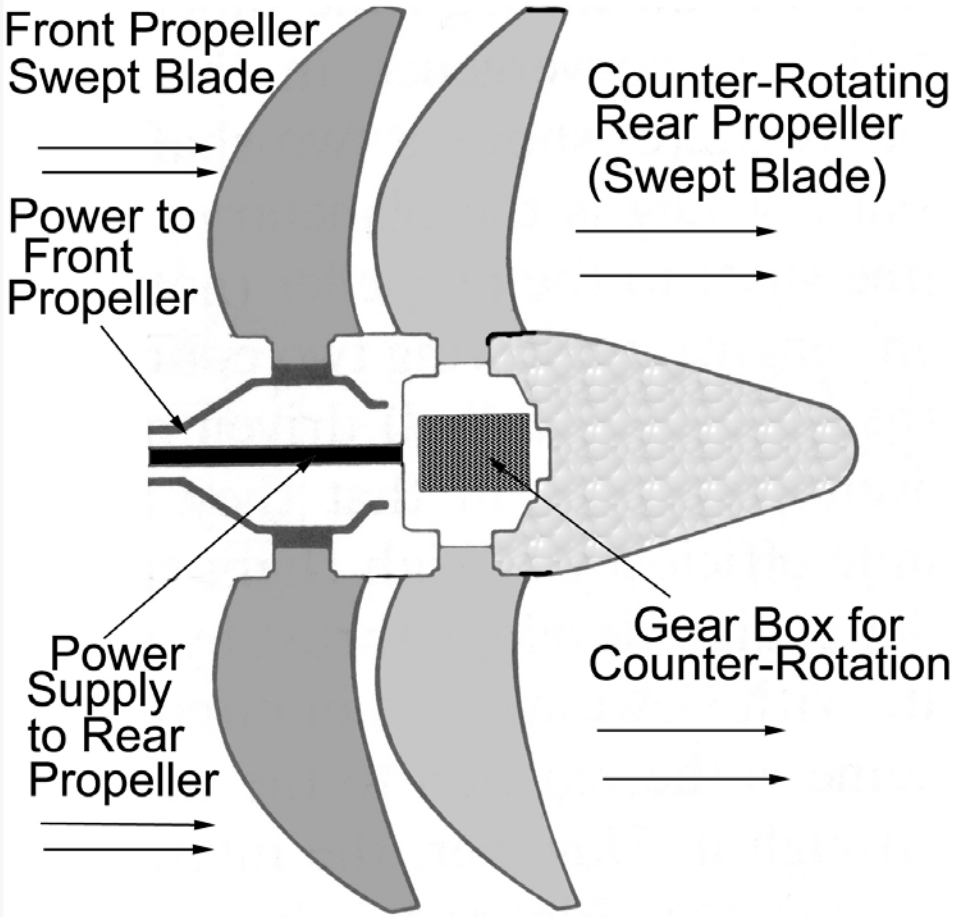
Prop-Fans or Unducted Fans



Size – In between a Big Fan and a Propeller

Bypass Ratio – 20 to 30

Counter Rotating Prop-Fans



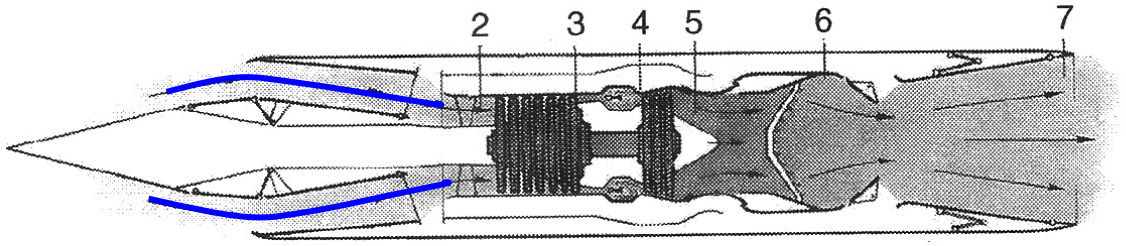
Prop-Fans are designed using both the propeller theory and the compressor blade design methods

All civil aircraft engines will need to conform to

Energy Audit

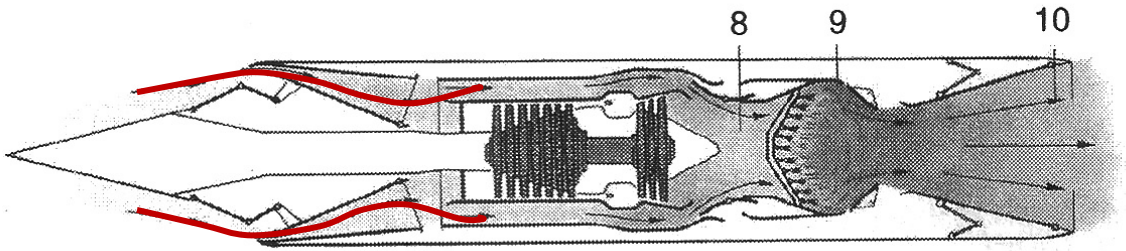
Environment Audit

Ramjet Wrapped around a Turbojet



Low Mach number

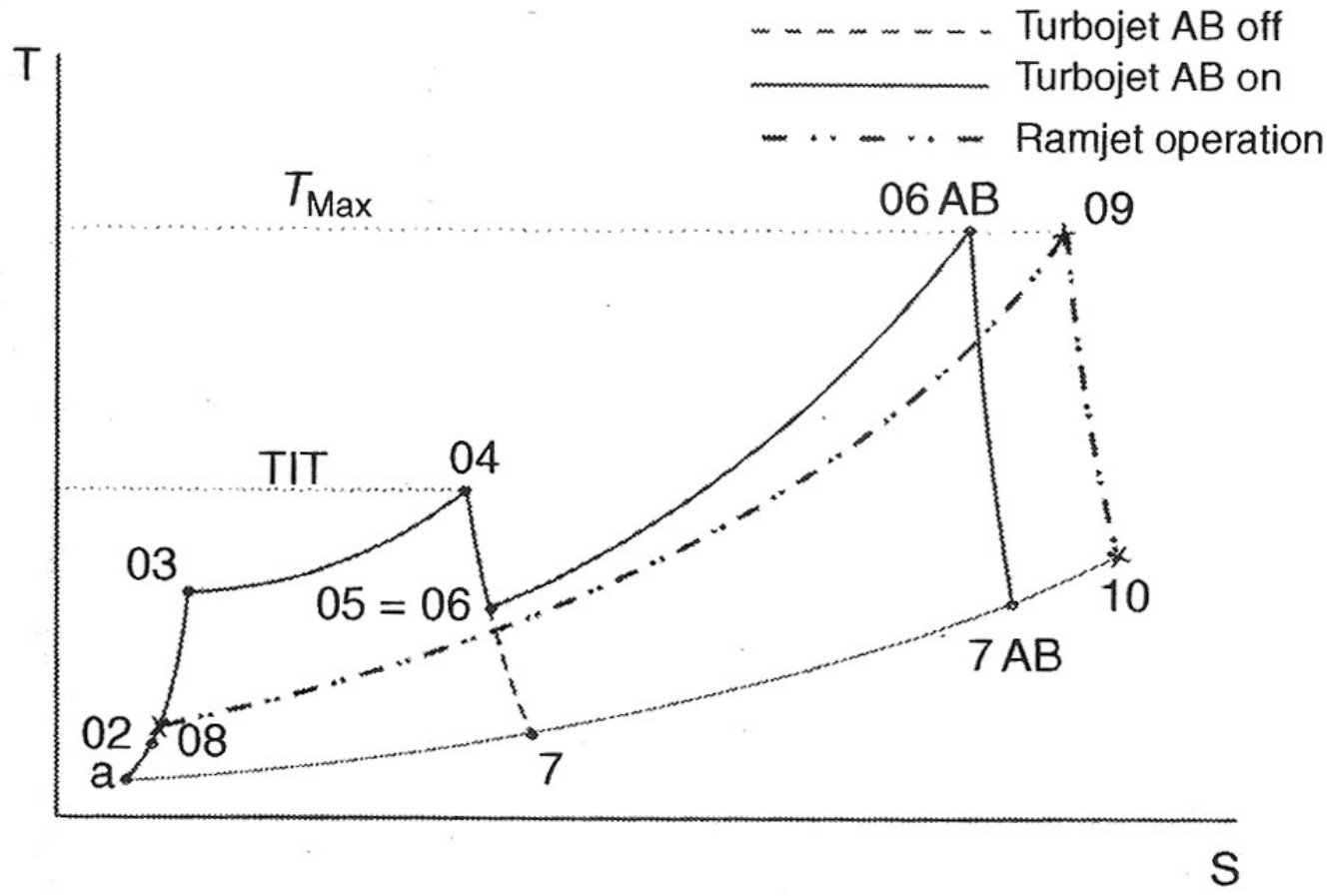
Mainly Turbojet



High Mach number

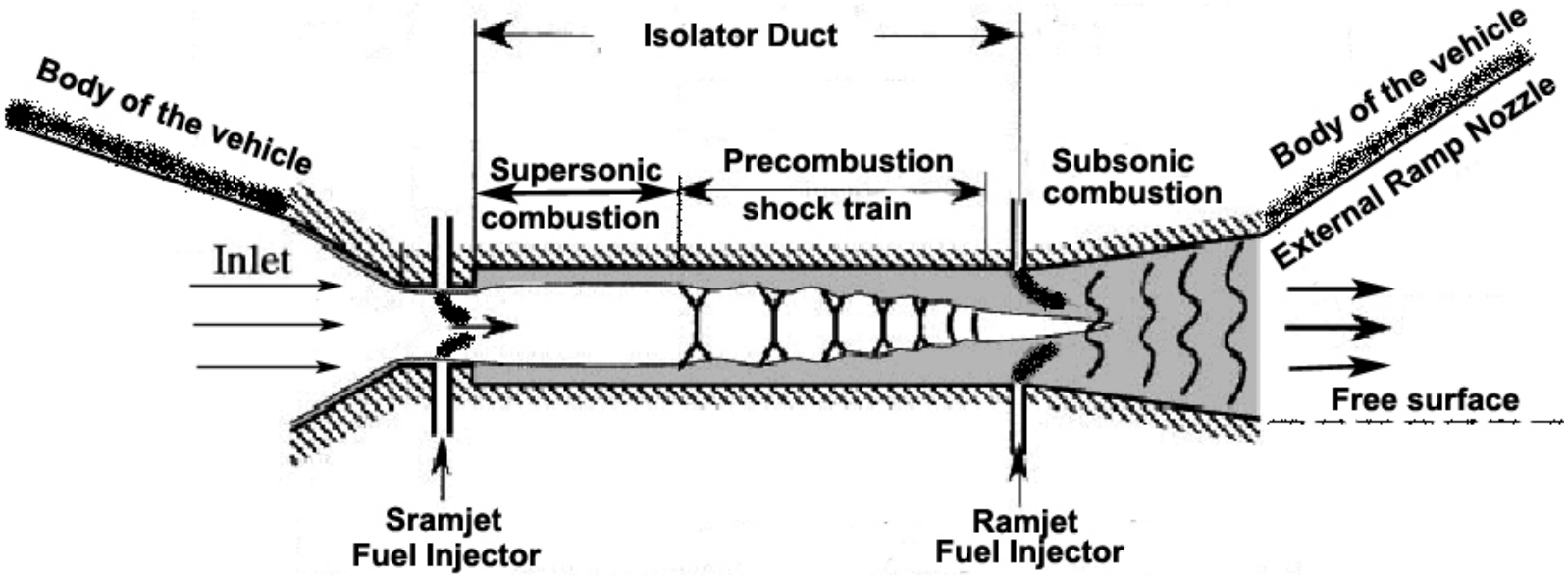
Mainly Ramjet

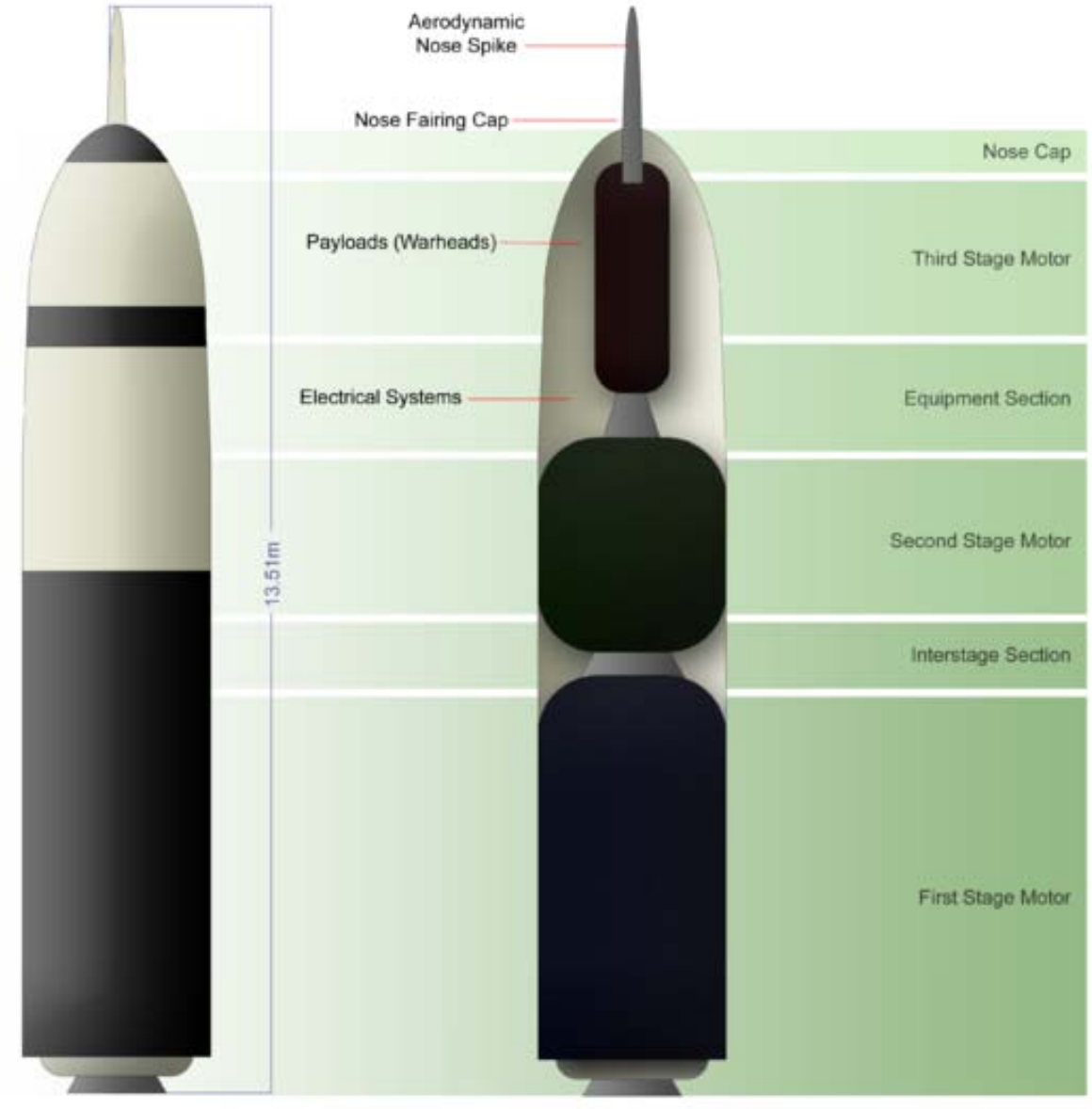
Wraparound Turboramjets



Turboramjet T-s Diagram

RAM – SCRAMJET schematic



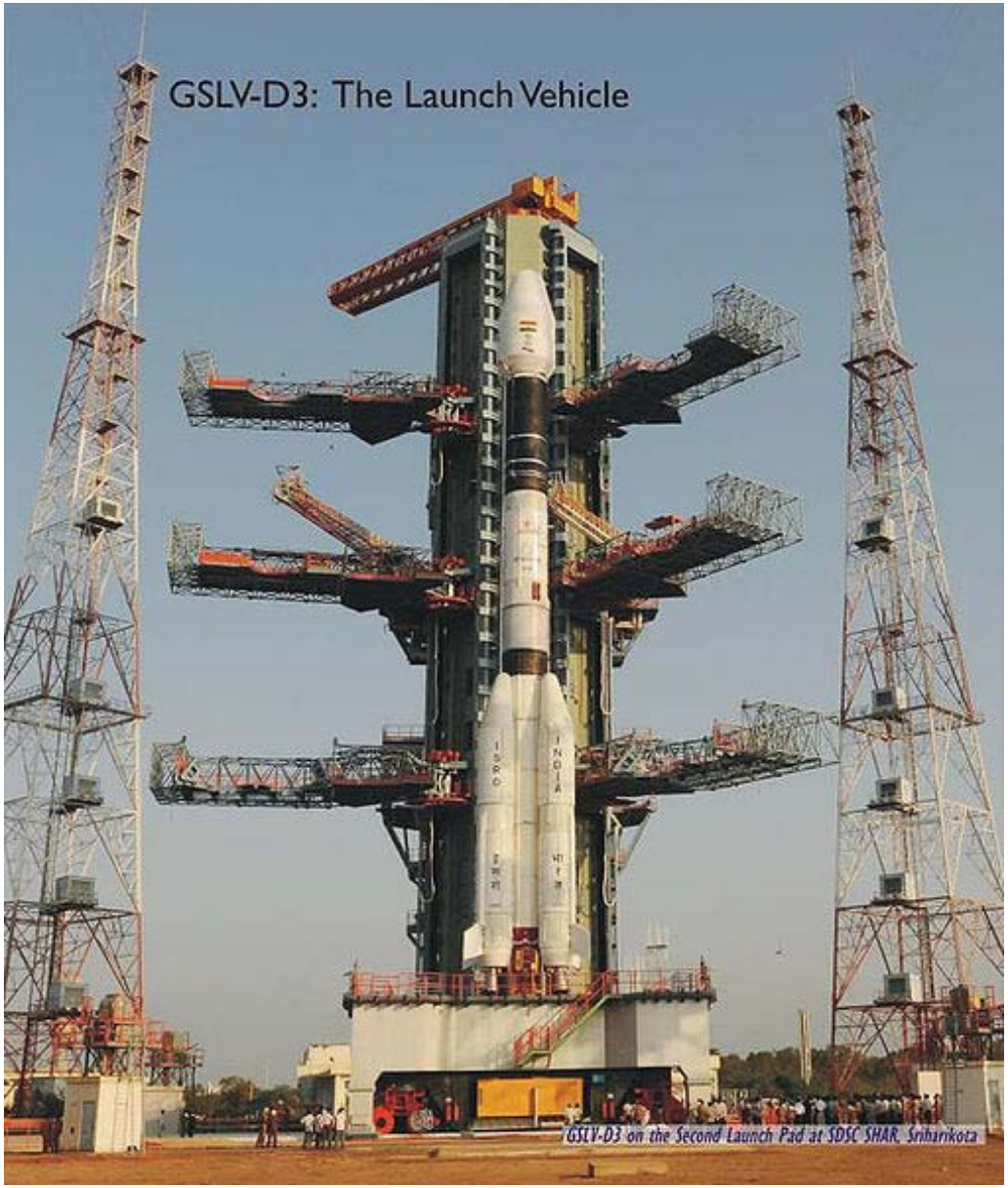


Missile configuration

PSLV Launch – used for Chandrayan-I

The PSLV has four stages using solid and liquid propulsion systems alternately.

The first stage is one of the largest solid-fuel rocket boosters in the world



GSLV-D3 -to be used for Chandrayan-II

1) **The GSLV uses four liquid strap-on boosters, which are loaded with hypergolic propellants (UDMH & N_2O_4)**
2) **1st Stage is of solid fuels**
3) **2nd Stage with liquid UDMH as fuel and nitrogen tetroxide (N_2O_4) as oxidizer**
4) **The 3rd stage is propelled by a cryogenic rocket engine (LoX+LH)**

This closes the course on

Introduction to Aerospace Propulsion