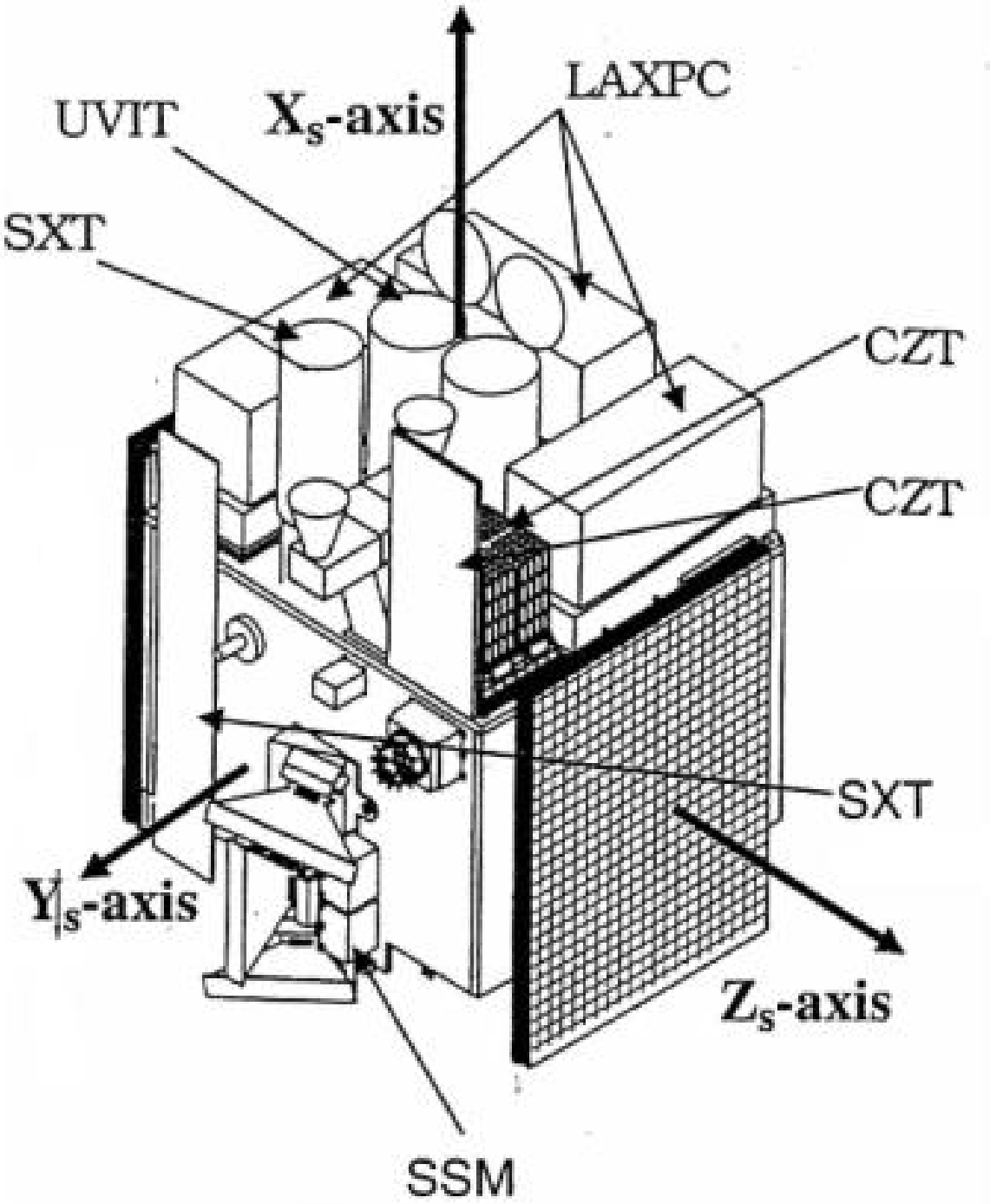
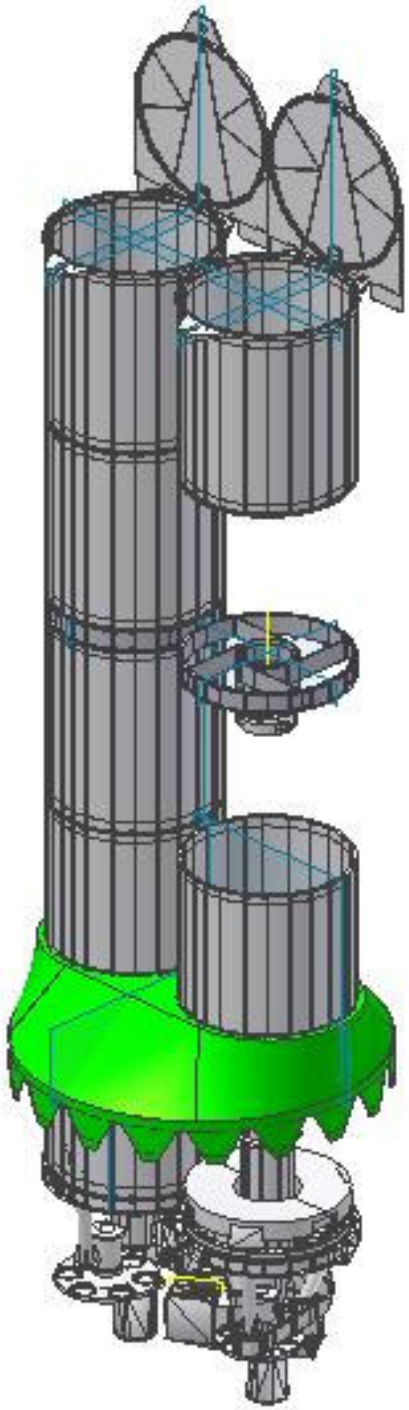
Thermal Control of the UVIT payload on Astrosat

P.K. Mahesh,
Mechanical Design Section


UVIT
X_s-axis
LAXPC
SXT
CZT
CZT
SXT
Y_s-axis
Z_s-axis
SSM



Sources of heat: The UVIT payload on Astrosat has the following sources of heat in its structure and associated parts.

a. 3 nos. of filter wheel motor – 3.5W each. This is located inside the telescope structure at the focal plane, below the primary mirror.

b. 3 nos. of detector (camera proximity unit/front end electronics) – 1.67W each. This is located inside the telescope structure at the focal plane, below the primary mirror.

c. High voltage supplies for the detectors – 3W each, 3nos. This is located inside the telescope structure at the focal plane, below the primary mirror.

d. Detector electronics box – 65W. This is located inside the satellite body and has only an electrical connection to the telescope structure and no mechanical or thermal connection. A cable length of 5m is allowed between the detector and this box.

e. 3nos. of power supply for filter wheel motors – 1.5W each. This is located inside the bus of the satellite, outside the telescope structure.

In addition to the above, solar irradiance, earth albedo and earthshine will be considered for the altitude and attitude of Astrosat.

In order to meet the requirement, any variable diagonal temperature gradients in the Invar tube should have a rate < 0.3deg C/1000s, i.e. a very high degree of stabilty in circular symmetry of temperature is required. The preferred temperature is 20 C, and the limits on temperature are 10deg C and 30deg C.