



# SPACECRAFT THERMAL CONTROL

The aim of Spacecraft Thermal Control (STC) is to guarantee that all equipment and structures, during their whole life, are maintained within acceptable temperature margins, for the different thermal loads imposed, at minimum overall cost; i.e. to maintain a delicate balance between the deep-freeze of the background, and the Sun's blazing heat. The trend in STC is to thermally decouple each payload from the platform (with multilayer insulation blankets), with each payload being responsible for its own thermal control within the given thermal interface conditions defined at system level.

This is a set of lectures on the fundamentals of STC at large, i.e. including thermal management during ascent and descent flights, shuttles and space stations, space suits, and not just restricted to the thermal control devices but to thermal engineering in general. It is organised in the following topics:

- [STC systems, missions and needs](#). An introduction to spacecraft design and the importance of the thermal control subsystem.
- [Space environment](#). A description of the thermal characteristics of the space environment, including planetary atmospheres. (Presentation on [Space thermal environment](#))
  - [Planet and moon properties](#)
- [Heat transfer and thermal radiation modelling](#). A review of Heat Transfer as applicable to spacecraft thermal control, i.e. with emphasis on thermal radiation exchanges. (Presentation on [Thermal Engineering introduction to Space Technology course](#))
  - [Table of thermo-optical properties](#).
  - [Table of view factors](#)
- [Spacecraft thermal modelling and testing](#) An analysis of spacecraft thermal design, covering design procedures, environmental thermal loads, the different aspects of load averaging, the thermal discretization process, some details on practical thermal simulation, and the physical tests that can be used to validate the predictions. (Presentation on [Thermal convection in space](#); Presentation on [Thermal radiation](#))
- STS Technologies and testing. A presentation of the state of the art in spacecraft thermal control practice, including some future prospects.

## References

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#### Some front covers of above mentioned books:



