Radiation Heat Transfer - Video course

COURSE OUTLINE

Blackbody radiation, radiative properties of surfaces, Kirchoff's law, configuration factor , gas radiation, Planck and Rosseland mean absorption coefficient, radiation in furnaces, radiative equilibrium, interaction between conduction, convection and radiation

COURSE DETAIL

Module I Properties of Surfaces
1. Introduction 2. Blackbody radiation 3. Properties of real surfaces 4. Spectral and directional variations
Module II Radiation exchange between surfaces
5. Shape factor 6. Triangular enclosure 7. Evaluation of shape factors 8. Radiation in enclosures 9. Electrical analogy 10. Applications 11. Non-gray enclosures 12. Enclosure with Specular surfaces 13. Integral method for enclosures
Module III Gas Radiation
14. Introduction to gas radiation 15. Plane parallel model 16. Diffusion approximation 17. Radiative equilibrium 18. Optically thick limit 19. Radiation spectroscopy 20. Isothermal gas emissivity 21. Band models 22. Total Emissivity method 23. Isothermal gas enclosures 24. Well-stirred furnace model 25. Gas radiation in complex enclosures 26. Interaction between radiation and other modes of heat transfer 27. Radiation heat transfer during flow over flat plate
Module IV Scattering
28. Radiation and Climate 29. Radiative-convective equilibrium

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Atmospheric Science

Pre-requisites:

Basic Heat Transfer.

Coordinators:

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30. Radiative equilibrium with scattering
31. Radiation measurement
32. Radiation with internal heat source
33. Particle scattering
34. Scattering in the atmosphere
35. Non-isotropic scattering
36. Approximate methods in scattering: 1
37. Approximate methods in scattering: 2
38. Monte Carlo method

References:

1. Siegel, R. and Howell, J., Thermal Radiation Heat Transfer, Taylor and Francis 2002.