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Unit 6 - Week 5

Register for Certification exam

Course outline

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- Approximate Methods-II
- The Method of Spherical Harmonics (PN Approximation)-I
- The Method of Spherical Harmonics (PN Approximation)-II
- Discrete Ordinate Method (DOM)
- Zone Method
- Quiz : Assignment 5
- Solution of Assignment 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-03-06, 23:59 IST**

1) Radiative problem between concentric cylinders of radius 0.5 m and 1.0 m, respectively is solved using the ***P_1* method.** Assuming gray medium ($\kappa = 0.1\ m^{-1}$) at radiative equilibrium between the cylinders ($T_1 = 500$ K, $T_2 = 1000$K), the temperature of the gas at r = 0.75 m is approximately: ***1 point***

- 900 K
- 752 K;
- 642 K
- 858 K

No, the answer is incorrect.
Score: 0

Accepted Answers:
900 K

2) Calculate the radiative heat flux from a gray non scattering isothermal medium using the Schuster-Schwarzschild approximation: ***1 point***

given τ_L=0.5,
τ=0,
T =500 K
T_w= 800 K.

- 17.8 KW/m^2
- -12.6 KW/m^2
- 1.872 KW/m^2
- -1.78 KW/m^2

No, the answer is incorrect.
Score: 0

Accepted Answers:
-12.6 KW/m^2

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- 4/3
- 2/3

No, the answer is incorrect.
Score: 0

Accepted Answers:
4/3

4) Consider gray isotropically scattering medium at radiative equilibrium bounded by gray isothermal plates at same uniform temperature T. The incident radiation, G(τ) as calculated with the **P_1 method** varies: ***1 po***

- Depends quadratically with optical thickness
- Depends inversely with optical thickness
- Independent of optical thickness
- Linearly with optical thickness

No, the answer is incorrect.
Score: 0

Accepted Answers:
Independent of optical thickness

5) Consider gray isotropically scattering medium bounded by gray isothermal plates at same uniform temperature *T*. If the heat flux between the plates varies linearly with optical path length, the incident radiation, *G(τ)* as calculated with the **P_1 method** varies ***1 point***

- Linearly with optical thickness
- Independent of optical thickness
- Depends inversely with optical thickness
- Depends quadratically with optical thickness

No, the answer is incorrect.
Score: 0

Accepted Answers:
Depends quadratically with optical thickness

6) Which of the following statements is true for first order spherical harmonics method P_1 ***1 point***

- Intensity is assumed to not depend on azimuth angle
- Intensity is assumed to not depend on polar angle
- Intensity is assumed to not depend on azimuth and polar angle
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
None of the above

7) In Discrete Ordinate Method (DOM), the ray effect refers to ***1 point***

- Widening of collimated radiation beam
- Spatial discretization errors in intensity
- Error due to scattering
- Angular discretization error

No, the answer is incorrect.
Score: 0

Accepted Answers:
Angular discretization error

8) Consider two large parallel, black and isothermal plates separated by a distance L. One plate is at temperature $T_1 = 800$ K and other is at $T_2 = 750$ K. Determine the approximate value of optical depth using non-symmetric S2 approximation method? Assume the radiative heat flux is 100 W/m^2 ***1 point***

- 70 m
- 52 m
- 20 m
- 40 m

No, the answer is incorrect.
Score: 0

Accepted Answers:
52 m

9) A gray gas (T_g = 800 K) is filled between two concentric infinitely long black cylinders. Both the cylinders are isothermal with diffuse surface. If cylinder 1 (R_1 =0.5 m, T_1 = 500 K) and cylinder 2 (R_2 = 1 m, T_2 = 1000 K). Using the Zone method calculate the direct exchange area s_1g per unit length of cylinder ***1 point***
Given $s_1s_2 = 0.75\ A_1$
$s_2s_2 = 0.75\ A_2$

- 1 m^2
- 0.785 m^2
- 0.545 m^2
- 0.25 m^2

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.785 m^2

10) In the above problem, determine the radiative heat flux per unit cylinder length on the cylinder 1 ***1 point***

- -44.787 kW/m^2
- 44.787 kW/m^2
- -140.83 kW/m^2
- 140.83 kW/m^2

No, the answer is incorrect.
Score: 0

Accepted Answers:
-44.787 kW/m^2

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