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TOPIC 9: STEADY STATE SOLUTIONS OF TWO DIMENSIONAL HEAT EQUATION

Write down all possible soly of two dimensional heat exc. (Du(auy) = (Acospa + B. Sin pa) (cepy Derpy) (Du(auy) = (Aepa + Be-Pa) (ccospy + D. Sinpy) (3) a(my) = (Ax+B)(C4+D) A Square pate plate is bounded by the Ames NEO 15=0 MEQ 3=Q. The lines 7=0 5=0 5=0 are Kept at o'c. The Side as a is kept at tempr. Bor. by ulay)=100 oxyxa Find ulay) The temp way is from x-a . 01-0 100 824 2 24 =0 y20 0 The Condy are () ((A10)=0 () u(a,a)=0 () u(019)=0 A (1(a,3)=100 The Suitable Sol. is u(mit)= (AeP+ Be-P+) (CCospy + D.Sinpy) - () Apply () 0= (A eP+ + Be= Px) (c) => (C=0) Apply D Sub cro in I u(ait)= (Aepa + Bepa) (DSinpy). Apply a in I pair a grand



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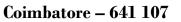


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D.Sippa = 0 Sin pa = 0 = Sin nis Sub P-my in Ti almis) = (Aeona Be-ma) (Desinony) - m $U(0,3) = (A+B) \cdot (D \cdot Sin n \cdot \frac{my}{a}) = 0$ APPly (m) ((m)y) = EA ALENDA - e-MAR) D.210 (MAY) The most geny. Soy is Maria)= 20 Du (Sund - 6 - 100) Sie (100) - 2 PPP15 (H) in X $\alpha(\mathbf{Q}_{n,2}) = \sum_{n=1}^{\infty} D_n \left(e^{n/2} - e^{-n/2} \right) \mathcal{L}(n(\frac{n/2}{\alpha}) = 100$ Dr (em_e-me) = a file Sin(n=1) dy = and Jin (not) day $= \frac{200}{\alpha} \left[- \frac{200}{\alpha} \left(\frac{n\pi y}{\alpha} \right) \left(\frac{n\pi y}{\alpha} \right) \right]_{\alpha}$ $=\frac{200}{\alpha}\left[+\frac{\alpha}{n\pi}\left(-1\right)^{n}+\frac{\alpha}{n\pi}\right]$ $=\frac{200}{\alpha}\times\frac{\alpha}{n\pi}\left[-(-1)^{n}+1\right]$ and stately gratiated $D_{n} \left[e^{n\pi} - e^{-n\pi} \right] = \begin{cases} 0 & n = 2, q_{1} & \dots \\ \frac{1}{200} & n = 1, 3, 5 & \dots \end{cases}$



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Dn= 400 0=43.5 nos em_ u(n14)= 004 7000 259 é 1=1,315 m