SUMMARY

Mathematical Study of Thick Circular Plate with Internal Heat Generation

This synopsis of project title "Mathematical Study of Thick Circular Plate with Internal Heat Generation" comprises five chapters. It contains study of thick circular plate with internal heat generation, effect of internal heat generation on thermoelastic behaviour of thick circular plate by quasi static approach and effect of Michell's function on limiting thickness of circular plate by using stress analysis.

Chapter 1: Introduction and Historical Review

In this chapter, introductory remarks and the historical survey of the literature related to the project have been included.

Chapter 2: Quasi Static Transient Thermal Stresses in a Thick circular plate with internal heat generation

In this chapter a thick circular plate is considered having external arbitrary heat supply on the upper surface with the lower surface is insulated and the heat is dissipated due to convection in surrounding through lateral surface. In this problem we determined the quasi static thermal stresses in thick circular plate with internal generation and also compute the effect of internal heat generation on thick circular plate along radial direction. To obtain the temperature distribution integral transform method is applied. The results for temperature, displacement and stresses have been computed numerically and illustrated graphically.

A mathematical model has been constructed of thick circular plate by considering copper (pure) circular plate.

Chapter 3: Quasi Static Transient Thermal Stresses in a Thick Circular Plate due to Axisymmetric Heat Supply

In this chapter a thick circular plate with internal heat generation is considered. Initially the plate is at zero temperature. Axisymmetric arbitrary heat flux is on the upper surface of thick circular plate and lower surface and the fixed circular edge is thermally insulated. In this problem we have modified the work of Kulkarni V.S. and Deshmukh K.C. [12]. In this problem we compute the effects of internal heat generation and axisymmetric heat supply in terms of stresses along radial direction. Also, we compute the effects of Michell function on the thickness of circular plate with internal heat generation in terms of stresses along radial direction. The governing heat conduction equation has been solved by the method of integral transform technique. The results are obtained in a series form in terms of Bessel's functions.

A mathematical model has been constructed with the help of numerical illustration by considering steel (0.5% carbon) limiting thick circular plate.

Chapter 4: References

This chapter contains references.

Chapter 5: Publication

Two papers are published.

1. Mathematical Modeling of Quasi Static Thermoelastic Transient behavior of thick circular plate with Internal Heat Generation, Int. Journal of Engineering Research and Applications, ISSN : 2248-9622, Open access, Vol. 4, Issue 9(Version 2), September 2014, pp.38-45.

2. Effect of Michell's Function in Stress Analysis Due to Axisymmetric Heat Supply of a Limiting Plate, Int. Journal of Engineering Research and

Applications, ISSN: 2248-9622, Open access, Vol. 6, Issue 4, (Part - 7) April 2016, pp.39-44.

The results obtained here are useful in engineering problems particularly in the determination of state of stress in thick circular plate and base of furnace of boiler of a thermal power plant and gas power plant.

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