



DEPARTMENT OF MECHANICAL ENGINEERING
NSS COLLEGE OF ENGINEERING,
PALAKKAD - 8

BTECH FINAL PROJECT 2023-24

1. **Project No** : A152024
2. **Project Title** : Study of shape factor in connection with natural convection in an open cavity
3. **Students Name** :

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4. **Project Guide** : SAJESH M

5. **Abstract** :

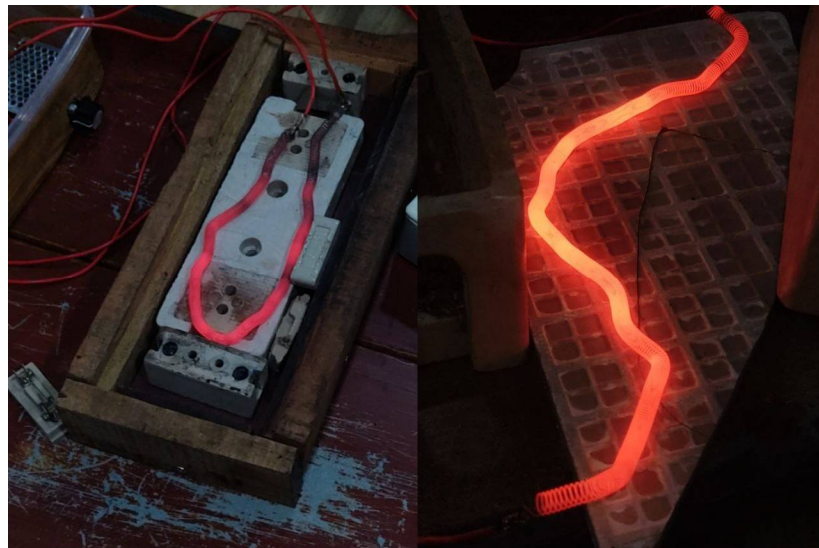
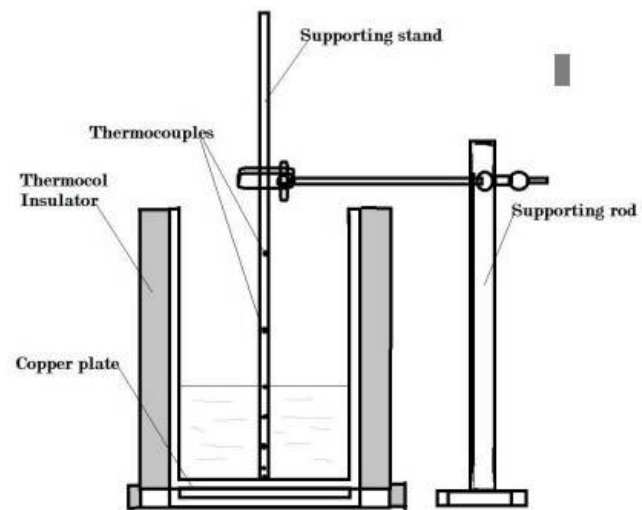
Natural convection heat transfer in open cavities holds significant practical implications, particularly in applications such as liquid desiccant regenerator systems. A systematic investigation is proposed to explore natural convection within an open cavity filled with calcium chloride and water, maintaining a constant volume. The primary objective of the study is to understand the influence of side wall shape on natural convection phenomena by examining different base shapes of equal area. The exploration of the said cases will be conducted through a combination of experimental and numerical approaches, aiming to develop a natural convection shape factor. The correlation between Nusselt number (Nu) and Rayleigh number (Ra) precisely:

$$Nu = C. Ra^n \big|_{L, \zeta = constant}$$

is anticipated to be established with reasonable accuracy during the course of the study. Additionally, the research tries to determine the optimum tilt angle of a heat pipe, offering a possibility of an alternative renewable heat source, like solar collector for the regeneration process. The comprehensive investigation not only advances the understanding of natural convection heat transfer but also has practical implications for enhancing the efficiency of liquid desiccant regenerator systems and similar thermal management applications.

Keywords: Natural convection, Open cavity, Shape factor, Rayleigh number(Ra), Nusselt number(Nu), Heat pipe

6. Project Picture :



7. Project Report :