

Development of a Nano-Enhanced Phase Change Material Based Wickless Heat Pipe: An Electronic Thermal Management Prospective

Graphical Abstract/ Layout

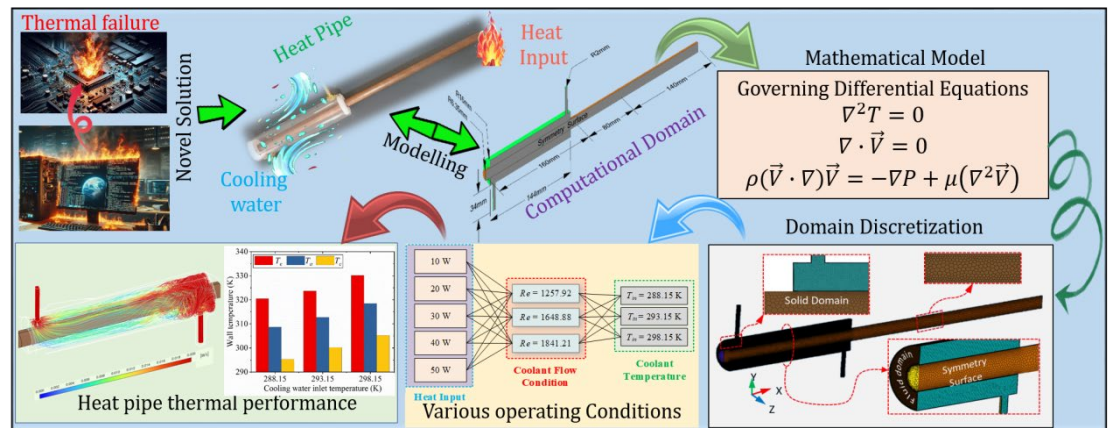


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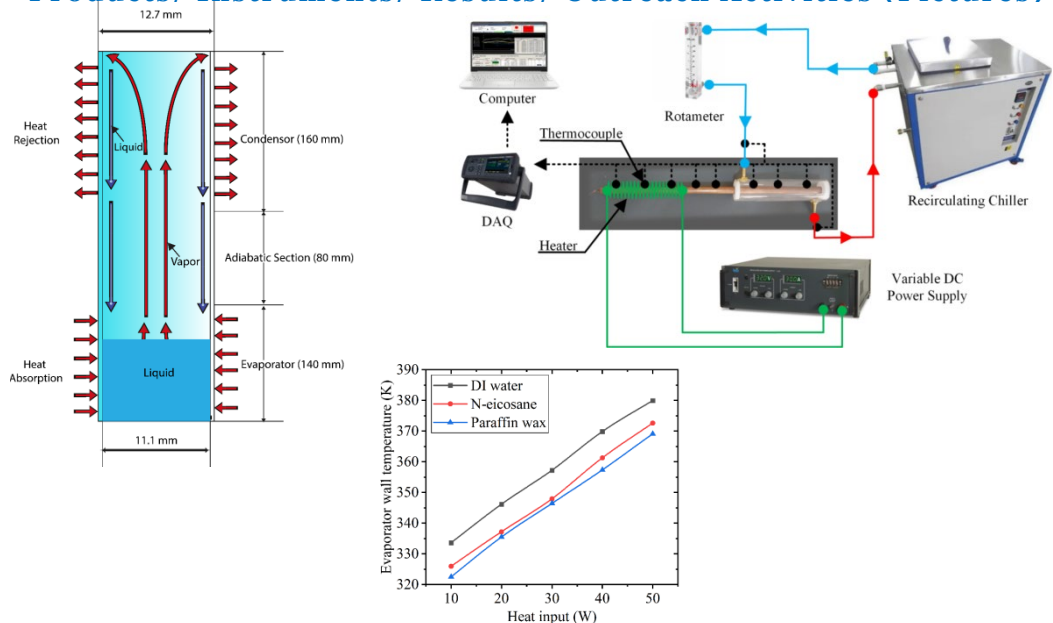
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Project Description

The project highlights the numerical investigation of the Nano-enhanced PCM (Ne-PCM)-based heat pipes to predict their thermal performance. These data will be fed to the Neuro-Genetic technique (Combined Artificial neural network and Genetic algorithm) to optimize the filling/concentration ratio of both the Nano-particles and PCMs inside the heat pipes. The heat pipe will then be fabricated as per the suitable dimensions. The goal is to provide an efficient solution for the thermal control of electronic components by developing a wick-less heat pipe. The Paraffin wax as the PCM and Aluminum Oxide (Al₂O₃) as the Nano-particle will be considered for the analysis. Experiments will be conducted for three different cases; a Heat pipe filled with DI water (this is the baseline case), a Heat pipe having a storage tank filled with PCM, and a Heat pipe having a storage tank filled with Ne-PCM. The heat transfer characteristics and thermal performance of the developed wick-less heat pipe will then be carried out. Finally, the Ne-PCM-based heat pipes will be benchmarked for the thermal management of electronics.

Products/ Instruments/ Results/ Outreach Activities (Pictures)



Sponsored Research and Industrial Consultancy (SpORIC)

Name of the Funding Agency
Science and Engineering Research Board (SERB)

Name of the Scheme
Teachers Association with Research Excellence (TARE)

Sanctioned Amount (in Rupees)
Rs. 18,30,000

Duration of the Project (years)
3