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Ph.D Seminar Talk 2

Title: **Experimental Investigation of Flat Heat Pipe**

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Date and time: **12-02-2026 at 3:00 PM**

Venue: https://meet.google.com/nbs-mcsg-jhw

Abstract

Experimental investigations of the thermal performance of a flat heat pipe (FHP) with and without wick columns were investigated. Copper metal foam fabricated by lost carbonate sintering process and characterized by Scanning Electron Microscope (SEM) was used as a wick structure. This study investigates the thermal performance of a flat heat pipe system under varying operational parameters, including heat input, Reynolds number, cooling water temperature, and fill ratio, with a focus on the influence of wick column (WC) configurations.

Experimental data reveal that increasing heat input generally reduces the heat transfer coefficient, while higher Reynolds numbers enhance convective cooling, lowering surface and vapor temperatures. The presence of WC components significantly improves thermal regulation by reducing surface and vapor temperatures, thermal resistance, and enhancing temperature uniformity. However, WC configurations also introduce flow resistance, leading to a slight reduction in heat transfer coefficient. Increasing fill ratio consistently improves thermal performance by lowering surface and vapor temperatures and reducing thermal resistance, with optimal results observed in systems incorporating two WC units. A predictive model for evaporator heat transfer coefficient, based on dimensionless numbers (Re, Pr, Ja), shows strong agreement with experimental data, with most predictions falling within ± 15% of measured values. These findings underscore the importance of optimizing fluid volume and structural enhancements to achieve efficient and reliable thermal management in heat pipe systems.