National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Performance Investigation of Common Header Pulsating Heat Pipe for Thermal Management of Machines
Speaker	: Dr. Manoj Kumar Moharana
Supervisor	: Prof. Saurav Datta (2524), PIC Departmental Seminar
Venue	: ME Seminar Hall (ME-001)
Date and Time	: 23 Sep 2025 (11:00 AM)
Abstract	: Efficient thermal management is critical for maintaining the performance and reliability of modern machines, especially those operating under high heat loads. This study investigates the thermal performance of a Common Header Pulsating Heat Pipe (CHPHP) as a passive cooling solution for machine components. The CHPHP is a closed-loop, wickless heat transfer device that leverages the oscillatory motion of a working fluid to transfer heat from a source to a sink without requiring external power. The experimental setup assesses the impact of key parameters, including fill ratio, working fluid type, heat input levels, and pipe orientation, on the thermal resistance and temperature distribution throughout the system. Results indicate that an optimal fill ratio and appropriate working fluid selection significantly enhance heat transfer efficiency. Additionally, the common header design enhances uniform fluid circulation, resulting in reduced thermal gradients and improved startup behavior. The system exhibits consistent performance across multiple heat input levels, demonstrating its adaptability to variable thermal loads. The findings suggest that CHPHPs offer a compact, energy-efficient, and reliable solution for passive thermal regulation in machines, with potential applications in electronics cooling, automotive systems, and industrial machinery. This work deals with innovative design for improved performance of pulsating heat pipes for robust and scalable thermal management systems.