

# Introduction to Heat Pipe Science and Technology

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## Overview

Heat Pipes and Two-Phase Thermosyphons are highly efficient heat transfer elements which utilize liquid-vapour phase change latent heat transport. They have found wide-spread application, ranging from microelectronics cooling in computers and satellites to large-scale waste heat recovery in various industries and power stations. Their modus operandi comprises a multitude of physical phenomena like surface physics, microscale heat and mass transfer, two-phase fluid mechanics and materials compatibility. These devices can be designed in a variety of geometrical shapes and dimensions (from very small cylindrical ball pen size tubes and thin flat plates over complex three-dimensional geometries to huge drum or box type elements and very long (over 100 m) cylindrical elements).

Due to their construction and operation principle and their geometrical design, a multitude of thermal tasks can be accomplished, besides highly efficient heat transport for cooling and heating applications, also special tasks like heat flux transformation, provision of isothermal spaces, thermal diode behaviour and many more.

The lecture course will give an introduction into the physics and operational behaviour of Heat Pipes and Two-Phase Thermosyphons and provide elementary tools for analysis and design of these systems. The most important types are discussed in some detail, and a rather comprehensive overview on technical applications is given.

Some practical design exercises will supplement the lecture.

<b>Dates of the course</b>	<b>December 6 - 19, 2016</b>
<b>Maximum Participants</b>	<b>50</b>
<b>Who Can Attend</b>	<ul style="list-style-type: none"><li>▪ Undergraduates, MTech/M.Sc, and PhD science stream students. Any student with a basic background in thermodynamics/fluid dynamics will be able to follow these lectures and gain valuable information.</li><li>▪ BTech/B.Sc and MTech/M.Sc level teachers who wish to update their knowledge in an important special field of heat transfer.</li><li>▪ Executives, engineers and researchers from industry, service and government organizations including R&amp;D laboratories who are engaged in thermal management problems.</li></ul>
<b>Fees</b>	The participation fees for taking the course is as follows: <b>Participants from abroad : US \$500</b> <b>Industry/ Research Organizations: INR 10, 000</b> <b>Academic Institutions: Faculty : INR 5000      Students : INR 2000</b> The above fee includes all instructional materials, computer use for tutorials, 24 h free internet facility. The participants will be provided with single bedded accommodation on payment basis.

## The Faculty



**Prof. Manfred Groll** is emeritus professor of University of Stuttgart, Germany. His research interests include heat pipes and two-phase thermosyphons, including micro and pulsating heat pipes; enhanced two-phase heat transfer, including micro heat transfer in pool and flow boiling; hydrogen storage, sorption heating and cooling systems employing metal hydrides; and nuclear safety. During 1975/76 he worked for two years at NASA Ames Research Center, Moffett Field, CA, USA on the development of heat pipe technology for satellite applications. He is Founding Member of the Committee on International Heat Pipe Conferences (1973), acted as Committee Chairman from 1990 till 2004, and since 2004 he is Honorary Chairman. In 2013 he has been awarded the prestigious George Grover Medal for outstanding contribution to the development of heat pipe science and technology.



**Dr. E. Anil Kumar** is an Assistant Professor of Indian Institute of Technology, Indore. His research interests are Metal hydride based energy conversion and storage systems, CO<sub>2</sub> adsorption and desorption cooling and heating systems.

## Course Co-ordinator

**Dr. E. Anil Kumar**  
Phone: +91 8602531178  
E-mail: anil@iiti.ac.in

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<http://www.gian.iiti.ac.in/>