

## Appendix

This section serves as a souvenir of the 17<sup>th</sup> International Heat Pipe Conference and includes the details of the following:

- A1.** Inaugural ceremony
  - A2.** Technical program and conference format
  - A3.** Conference sessions and session chairpersons
  - A4.** Country-wise statistics of participation
  - A5.** List of papers presented during the conference
  - A6.** Awards and honors presented during the conference
  - A7.** Memories
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### **A1: Inaugural ceremony**

The inauguration ceremony of the 17<sup>th</sup> IHPC was scheduled as follows:

Date : Monday, October 14, 2013,  
Venue : Outreach '69 & '80 Building Auditorium  
Time : 09:00 to 10:00 hrs.

#### **Chief Guest**

Dr. Ravi B. Grover  
Fellow of the Indian National Academy of Engineering  
Director, Homi Bhabha National Institute  
Trombay, Mumbai, India

#### **Guest of Honor**

Mr. N. Prahlad Rao  
Director, Satellite Communication and Navigation Program  
Indian Space Research Organization  
Bengaluru, India

## A2: Technical Program and Conference Format

The technical program of the conference was as follows:

- Four keynote lectures, as detailed below:

#	Speaker	Title	Session Chairperson
1	Prof. Manfred Groll Germany	Heat Pipe Science and Technology: A Historical Review	Prof. Yuri Maydanik
2	Mr. N. Prahlad Rao India	State of the Art of Heat Pipe Technology at ISRO, India	Mr. Wolfgang Supper
3	Prof. Vadym Nikolayev France	Oscillating Menisci and Liquid Films at Evaporation/ Condensation	Prof. Jocelyn Bonjour
4	Dr. Masataka Mochizuki Japan	Heat Pipes: Evolution of Endless Application Opportunities	Prof. Marcia Mantelli

- 50 technical papers: 11 Oral Sessions.
- 40 technical papers: 2 Poster Sessions.
- There were no parallel sessions.

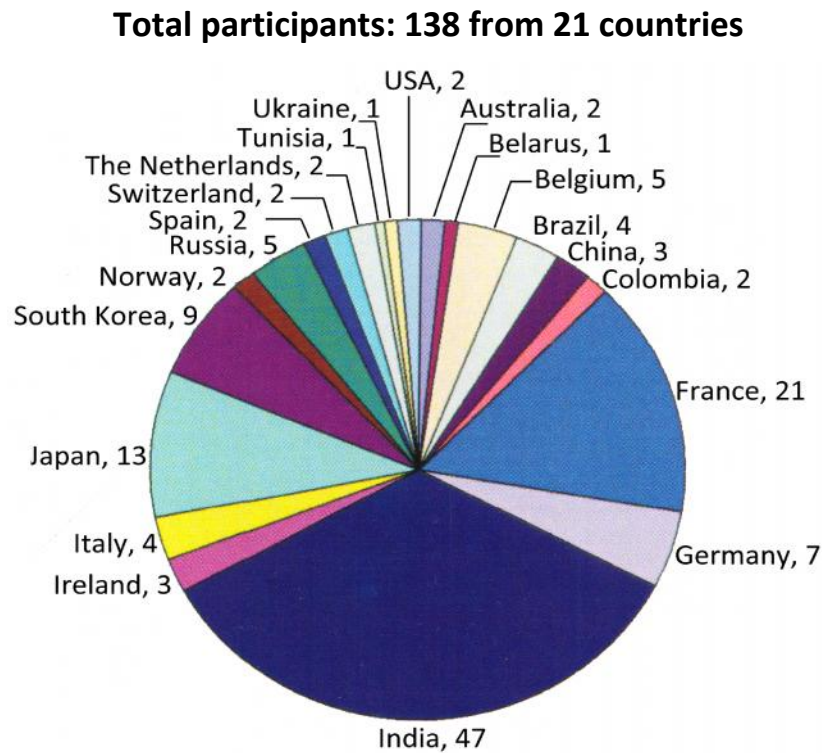
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## A3: Conference Sessions and Session Chairpersons

### Session      Title

- #1:**                    **Fundamentals/ Transport Phenomena**  
Prof. Vadim Nikolayev
- #2 and #3:**        **Conventional Heat Pipes/ Thermosyphons**  
Prof. Leonard Vasiliev and Prof. Joon Hong Boo
- #4 and #5:**        **Loop Heat Pipes/ Capillary Pumped Loops**  
Prof. Yevs Bertin and Dr. Christophe Figus
- #6 and #7:**        **Space Applications**  
Dr. Konstantin Goncharov and Dr. Amrit Ambirajan
- #8 and #9**         **Pulsating/Oscillating Heat Pipes**  
Prof. Frédéric Lefèvre and Prof. Marco Marengo
- #10 and #11**      **Terrestrial Applications**  
Dr. Rudi Kulenovic and Mr. Pavan Sharma

#### A4. Country-wise statistics of participation



#### A5: List of papers presented during the conference

17 <sup>th</sup> International Heat Pipe Conference October 14-17, 2013, Kanpur, India List of papers presented (Oral and Poster Mode)		
Oral Mode Presentation		
#	Author/s	Title
<b>Day 1 (October 14, 2013): Keynote Lecture #1</b>		
KN1	Manfred Groll, Germany	Heat Pipe Science and Technology: A Historical Review
<b>Day 1 (October 14, 2013): Session #1: Fundamentals/ Transport Phenomena (05 Papers)</b>		
1	Vyas Srinivasan and Sameer Khandekar	Motion of an Isolated Liquid Plug Inside a Dry Circular Capillary
2	Manoj Rao, Frédéric Lefèvre, Jocelyn Bonjour and Sameer Khandekar	Thermally induced Two-Phase Oscillating flow in a Capillary Tube: Theoretical and Experimental Investigations
3	Karthik Remella Siva Rama, Frank Gerner and Ahmed Shuja	Investigation of Entrainment Through Folded Porous Metallic Mesh Screens

4	Balkrishna Mehta and Sameer Khandekar	Infrared Thermography of Pulsating Taylor Bubble Train Flow in a Mini-Channel
5	Jean Antoine Gruss, Jean Dijon, Adeline Fournier, Rémi Bertossi, Philippe Marty and Nadia Caney	Enhancement of Two-Phase Boiling by Carbon Nanotube Forests
<b>Day 1 (October 14, 2013): Heat Pipes and Thermosyphons, Including Special Passive Structures Session #2 (05 Papers) and Session #3: (03 Papers)</b>		
6	Stéphane Lips and Frederic Lefevre	An Analytical Heat Pipe Model to Estimate the Fundamental Properties of a Capillary Structure
7	Masahiro Kuroda, Je-Young Chang, Paul Gwin, Rajiv Mongia, Choong-Un Kim, Gerald Cabusao, Kazuhiko Goto and Masataka Mochizuki	Development of Aluminum-Water Heat Pipes
8	Julia Fransozi Carneiro, Kênia W. Milanez, Fernando Henrique Milanese and Márcia B. H. Mantelli	Experimental Study of a Two-Phase Closed Thermosyphon Charged with an Immiscible Mixture
9	L. P. Grakovich, M. L. Rabetsky, L. L. Vasiliev, L. L. Vasiliev Jr., S. P. Bogdanovich, S. S. Pesetskii	Polymer Flat Loop Thermosyphons
10	Abhishek Basak, I.V. Dulera, P.K. Vijayan and K.K. Vaze	High Temperature Heat Pipes and Thermosyphons for Compact High Temperature Reactor (CHTR)
11	Kate Smith, Samuel Siedel, Anthony Robinson and Roger Kempers	Visual Study of Fluid Dynamics in Both Wickless and Wickless Transparent Heat Pipes
12	Sauro Filippeschi and Alessandro Franco	Experimental Analysis of the Instabilities Effect on the Thermal Performance of a Closed Loop Two-Phase Thermosyphon
13	C. Figus, M. Paulhiac, S. Arnaud, A. Larue	Development and Test of a "Two-Phase" Structure
<b>Day 2 (October 15, 2013): Keynote Lecture #2</b>		
KN2	N. Prahalad Rao, India	Indian Space Mission and Advanced Heat Pipe Technologies
<b>Day 2 (October 15, 2013): Loop Heat Pipes/Capillary Pumped Loops Session #4 (04 Papers) and Session #5 (05 Papers)</b>		
14	Nicolas Blet, Vincent Ayel, Yves Bertin, Cyril Romestant and Vincent Platel	Transient Modeling of CPL for Terrestrial Application, Part A: Formalism & Influence of Gravity on the CPL Behavior
15	Nicolas Blet, Vincent Ayel, Yves Bertin, Cyril Romestant and Vincent Platel	Transient modeling of CPL for Terrestrial Application, Part B: Do we need a Transient Reservoir Model?
16	Benjamin Siedel, Valérie Sartre and Frédéric Lefèvre	Two-Dimensional Analytical Model of a Loop Heat Pipe Evaporator
17	Safouène Ouenzerfi, Thibaut Barreteau, Valerie Sartre and Jocelyn Bonjour	Experimental Comparison of Loop Heat Pipe Performance with Various Evaporator Designs
18	Masahito Nishikawara and Hosei Nagano	Evaporator Heat-Transfer Performance of a Loop Heat Pipe with Low Thermal Conductivity Wicks
19	Vincent Dupont, Jean-Claude Legros, Stéphane Van Oost and Laurent Barremaecker	Experimental Investigations of a CPL Pressurized with NCG Inside a Centrifuge up to 10 G.
20	Vincent Dupont, Stéphane Van Oost, Laurent Barremaecker and Sébastien Nicolau	Railways Qualification Tests of Capillary Pumped Loop on a Train.

21	V. G. Pastukhov, Yu. F. Maydanik	Development and Investigation of an Improved LHP- PHP Heat-Transfer System
22	M. A. Chernysheva, S. I. Yushakova, Yu. F. Maydanik	Research on Operating Parameters of Copper-Water Loop Heat Pipes with Flat Evaporator
<b>Day 2 (October 15, 2013): Space and Aerospace Related Topics and Applications, including MHP/LHP/CPL Session #6 (05 Papers) and #7 (05 papers)</b>		
23	Hiroki Nagai, Hiromichi Tamamura, Hosei Nagano and Hiroyuki Ogawa	Experimental Study on Startup Behavior Considering Gravity Effect of a Miniature Loop Heat Pipe
24	Abhijit A. Adoni, Amrit Ambirajan, Jasvanth V. S., Dinesh Kumar and Pradip Dutta	Effect of Working Fluid on 3-Port CPL Performance: An Experimental Investigation
25	Saleem M Basha, Lalit K Bansal, Saptarshi Basu and Amrit Ambirajan	Performance Analysis and Bubble Visualization within the Evaporator of a Loop Heat Pipe
26	Kara Walker, Calin Tarau and William Anderson	Grooved and Self-Venting Arterial Heat Pipes for Space Fission Power
27*	Siyuan Chen, Bangcheng Ai, Jijun Yu and Wei Qu	The Application of High Temperature Heat Pipe Technique on Hypersonic Vehicle Thermal Protection
28	Kleber Paiva, Marcia Mantelli, Gustavo Nuernberg and Juan Pablo Florez	Mini Heat Pipes Experiments Under Microgravity Conditions. What Have We Learned?
29	D. R. Veerasha, Ch. Simhachal Rao, M. K. Shailandran, S. G. Barve, Dinesh Kumar and Anand Kumar Sharma	Application of Flat Plate Heat Pipe for Cooling Spacecraft Electronics
30	K. Goncharov, A. Golikov	10 Years Experience of Loop Heat Pipes operation on board "YAMAL-200" Satellite.
31*	K. Goncharov, O. Rassalov, A. Khemel'nitsky	Carbon Fiber Panel with Aluminum Heat Pipes
32	Atsushi Okamoto, Makiko Ando, Hiroyuki Sugita	Initial Evaluation of On-Orbit Experiment of Flat-Plate Heat Pipe
<b>Day 3 (October 16, 2013): Keynote Lecture #3</b>		
KN3	Vadim Nikolayev	Oscillating Menisci and Liquid Films at Evaporation/Condensation
<b>Day 3 (October 16, 2013): Pulsating/Oscillating Heat Pipes Session #8 (04 Papers) and Session #9 (05 Papers)</b>		
33	V. K. Karthikeyan, Sameer Khandekar and B. C. Pillai	Infrared Thermography of a Closed Loop Pulsating Heat Pipe
34	Philippe Gully, Fabien Bonnet, Vadim Nikolayev, Nicolas Luchier and Trung Quan Tran	Evaluation of the Vapor Thermodynamic State in PHP
35	Vincent Ayel, Cyril Romestant, Yves Bertin, Vincenzo Manno and Sauro Filippeschi	Visualization of Flow Patterns in Flat Plate Pulsating Heat Pipe: Influence of Hydraulic Behaviour on Thermal Performances
36	Nicolas Chauris, Jean-François Bonnenfant, Vincent Ayel, Cyril Romestant and Yves Bertin	About the Relevance of Local IR Visualization on Tube Walls of Pulsating Heat Pipes: A Modeling Investigation
37*	Zhihu Xue, Minghui Xie, Wei Qu, Jijun Yu and Wei Li	Experimental Investigation of Closed Loop Pulsating Heat Pipe Using Ammonia Fluid: Effect of Different Turns and Inclination Angles
38	Nandan Saha, P. K. Sharma and P. K. Das	An Experimental Investigation on the Performance of Closed Loop Pulsating Heat Pipe
39	Mauro Mameli, Marco Marengo, Sauro Filippeschi and Vincenzo Manno	Multi-Parametric Investigation on the Thermal Instability of a Closed Loop Pulsating Heat Pipe

40	Hiroki Nagai, Takamu Kanayama and Takuro Daimaru	Heat Transfer Performance of Oscillating Heat Pipe by Difference of Surface Characteristics
41	Naoko Iwata, Hiroyuki Ogawa and Yoshiro Miyazaki	Visualization of Oscillating Heat Pipe under Microgravity
<b>Day 4 (October 17, 2013): Keynote Lecture #4</b>		
KN4	Masataka Mochizuki	Heat Pipes: Evolution of Endless Application Opportunities
<b>Day 4 (October 17, 2013): Terrestrial Applications and Related Topics Session #10 (04 Papers) and Session #11 (05 Papers)</b>		
42	Shigeki Hirasawa	Transient Heat Transfer Characteristics of Inclined Loop Heat Pipe for Solar Collector with Changing Input Solar Heat Flux
43	Mathieu Habert and Bruno Agostini	Air-to-Air Thermosyphon Heat Exchanger for Cabinet Cooling
44	Masataka Mochizuki, Thang Nguyen, Koichi Mashiko, Yuji Saito, Shahed Ahamed, Randeep Singh and Thanh Long Phan	Ultra-Thin High Performance Heat Pipe for Thin and Light Portable Computing Devices
45	Benjamin Reul, Tobias Döpmeier and Peter Stephan	Experimental Study of a Loop Heat Pipe System for Automotive Exhaust Gas Heat Recovery
46	Randeep Singh, Masataka Mochizuki, Yuji Saito, Tadao Yamada, Thang Nguyen and Tien Nguyen	Loop Heat Pipe Applications in Automotive Thermal Control
47	Amit Sharma, Sanjeev Jain and Subhash Kaushik	U-Shaped Heat Pipe Heat Exchanger for Air-Conditioning Applications
48	Luis Alonso Betancur Arboleda and Farid Chejne Janna	Evaporator Using Heat Pipe Heat Exchanger for a Heat Recovery System
49	Joon Hong Boo, Jae Hyuk Shin, Seung Shin Yi	Cooling of a Concentrated Photovoltaic Cell Using Heat Pipes
50	Rudi Kulenovic, Rainer Mertz, Steven Hartmann	Feasibility Study on the Thermal Management of Inductive Distance Sensors by a Heat Pipe Cooling System

<b>Poster Mode Presentation</b>		
<b>Poster Session #1 and #2</b>		
<b>(All Posters were displayed together and remained displayed for the entire conference duration)</b>		
51*	Jed Mansouri, Samah Maalej and Mohamed Chaker Zaghdoudi	Experimental and Theoretical Analysis of Flows and Heat Transfer Within Grooved Flat Mini Heat Pipes
52	Thomas Albertin, Jerome Coulloux and Maxime Louchart	Atherm: A Loop Heat Pipe European Industrial New Manufacturer
53	Romain Hodot, Valérie Sartre, Frédéric Lefevre and Claude Sarno	3D Modeling and Optimization of a Loop Heat Pipe Evaporator
54	Ashutosh Singh, Ashok Satapathy and Pooja Jhunjhunwala	Numerical Analysis of Performance of Closed-Loop Pulsating Heat Pipe
55	Kamlesh Kumar Baraya	Application of Heat Pipes in Satellites
56	A. Brusly Solomon, K. Ramachandran, B. C. Pillai and V. K. Karthikeyan	Experimental and Numerical Studies of a Heat Pipe
57	Riadh Boubaker, Vincent Platel and Sebastien Nicolau	Dynamic Model of Phase Change in the CPL Evaporator
58	Natalia Savchenkova and Vladimir Sasin	Conditions of Working Ability of Pulsating Pump of Heat action
59	Yaser Mollaei Barzi and Mohsen Assadi	Experimental and Theoretical Investigation of a Loop Heat Pipe/Thermosyphon Behavior in a Heat Recovery System Application
60	Pramod Pachghare and Ashish Mahalle	Thermal Analysis and Flow Visualization of Closed Loop Pulsating Heat Pipe using Pure and Binary Working Fluid
61	Sandesh Chougule, Santosh Kumar Sahu, Ashok Pise and M. M. Narke	Performance Enhancement of Two Phase Thermosyphon Solar Water Heater Using Surfactant
62	Purna Chandra Mishra, Manasee Mishra, Manoj Ukamanal and Susant Sahu	Experimental Investigation on Thermo-mechanical Characteristics of AlSiC <sub>p</sub> Metal Matrix Composite for Heat Pipes
63	Basant Singh Sikarwar, K. Muralidhar and Sameer Khandekar	Recent Developments in Modeling of Dropwise Condensation Process
64*	Alexandr Gershuni, Vladilen Zaripov and Volodymyr Baturkin	Structural, Thermo-Physical and Mechanical Characteristics of Metal Fiber Wicks of Modern Heat Pipes
65	S. Kesav Kumar and S. N. Sridhara	Thermal Network Model to Predict Temperature in Heat Sink Assisted Flat Heat Pipes
66	Arpana Prasad, A. R. Anand, Raghavendra Kumar, V. Ramakrishnan, Amrit Ambirajan, Dinesh Kumar and Pradip Dutta	Measurement of Thermal Conductivity, Pore-Size, Permeability and Coefficient of Thermal Expansion of a Porous Nickel Wick for LHPS
67	Adel Benselama, Cyril Romestant, Yves Bertin and Vincent Ayel	Investigation of Thermogravity/Thermocapillary Effects in Rotating Heat Pipes: Prediction of Instabilities at the Liquid Film
68	Kate Smith, Samuel Siedel, Anthony Robinson and Roger Kempers	Investigation of Thermosyphon Performance with Changing Adiabatic Section Geometry

69	Kênia Warmling Milanez, Fernando H. Milanez and Marcia B. H. Mantelli	Development of a Continuous Cooking Oven with the Two-Phase Thermosyphon Technology
70	Bishnu Mahapatra, Himanshu Poonia, Nandan Saha and Prasanta Das	Important Non Dimensional Numbers for Pulsating Heat Pipes, their Significance and Inter Relationship
71	Yoshiro Miyazaki, Naoko Iwata and Hiroyuki Ogawa	Principle of Oscillating Heat Pipe
72	Pankaj Srivastava, Sameer Khandekar, J. K. Bajpai and A. K. Sahani	An Experimental Investigation of Phase Change Material (PCM) for Heat Management of Instruments
73	Hiroyuki Ogawa, Naoko Iwata, Takeshi Takashima and Tadayuki Takahashi	Use of Quick Couplings in Loop Heat Pipe
74	Yasuko Shibano and Hiroyuki Ogawa	Thermal Performance of Re-Entrant Groove Heat Pipe: Dependence on Orientation and Temperature
75	D. R. Veerasha, M. K. Shailandran, Ch. Rama Kishore, S. G. Barve, Dinesh Kumar and Anand Kumar Sharma	Optimization of Heat Pipe Panel for Communication Spacecraft
76	K. Goncharov, V. Antonov	Experience of Space Application of Axial Groove Heat Pipes with $\pi$ -Shape Grooves
77	Bhawna Verma, V. L. Yadav, K. K. Srivastava	Heat Transfer Studies in a Closed Loop Pulsating Heat Pipe
78	Jeehoon Choi, Byungho Sung, Yunkeun Lee, Minwhan Seo, Xuan Hung Nguyen, Chulju Kim	Compact Two-Phase Loop Cooling System Applications for High Density Power Computer Workstation and Servers
79	Sang Min Kim, Yong Heak Kang, Joon Hong Boo	Thermal Performance of a High-Temperature Solar Absorber Embedded with Liquid Metal Heat Pipes
80	E. Turrión, J. Meléndez, D. Mishkinis and A. Torres	Ethane Two-Phase Thermal Control for Cryogenics Applications
81	B. S. Bhullar, D. Gangacharyulu, S. K. Das	Thermal Performance of Mesh Wicked Heat Pipe using $Al_2O_3$ Nanofluids
82	P. Di Marco, S. Filippeschi	Electrical Force Effect on a Capillary Loop Two-Phase Thermosyphon
83	Dong Soo Jang, Eun-Ji Lee, Yonghee Jang, Yongchan Kim	Performance Characteristics of Flat Plate Pulsating Heat Pipes with Mini- and Micro-channels
84*	Wei Qu, Ai Bangcheng, Yu Jijun	Precise Differential Mechanism, Sodium Charging Equipment and Heat Pipe Performance

*\* These papers could not be actually presented as either (i) the authors could not attend the conference due to travel/visa/logistical issues, or (ii) the authors withdrew the paper at the last moment.*



## A6: Awards and Honors Presented during the Conference

### GEORGE GROVER MEDAL



The Committee on International Heat Pipe Conferences has established the George Grover Medal to honor individuals for their outstanding contributions to the development of Heat Pipe Science and Technology. The medal is named in honor of Dr. George Grover, who, with his first external publication in 1963 on heat pipes, laid the foundation for all heat pipe research and development. The award was given for the first time at the 14th IHPC in Florianopolis, Brazil. This award is given in two categories:

- Young Scientist Award (recognizing promising young individuals typically working in the field less than 10 years)
- Distinguished Scientist Award (recognizing significant and sustained contributions in the field).

The recipient of the George Grover Young Scientist Medal during the 17<sup>th</sup> IHPC was:

h **Fernando H. Milanez**  
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The recipients of the George Grover Distinguished Scientist Award were:

**Prof. Dr. Manfred Groll**

## ***BEST PAPER AWARD(S)***



This Best Papers Award category was established in memory of Donald M. Ernst by his friends and colleagues to honor his achievements in the fields of Heat Pipe research, product development and commercialization. It was given for the first time at the 16th IHPC in Lyon. The selection will be done by the International Heat Pipe Conference Committee from amongst the papers presented during the conference. The award includes a cash prize and a certificate. The award is given in two categories: (i) for fundamental research and, (ii) for technical/technology applications.

The following four papers received the best paper awards during the conference:

### **Evaluation of the Vapor Thermodynamic State in PHP**

Philippe Gully, Fabien Bonnet, Vadim Nikolayev, Nicolas Luchier and Trung Quan Tran

### **Development and Test of a "Two-Phase" Structure**

C. Figus, M. Paulhiac, S. Arnaud and A. Larue

### **Ethane Two-Phase Thermal Control for Cryogenics Applications**

E. Turrión, J. Meléndez, D. Mishkinis and A. Torres

### **Effect of Working Fluid on 3-Port CPL Performance: An Experimental Investigation**

Abhijit A. Adoni, Amrit Ambirajan, V. S. Jasvanth, Dinesh Kumar and Pradip Dutta

**A7: Memories**



**Opening Ceremony and Sessions**



**Outreach Auditorium Ground**



**Cultural Evening**