Education Committee
ASME Heat Transfer Division

Minutes – IMECE 2001

Tuesday, November 15th, 2001, 10:00 - 12:00 am

Attendance: Aganofer, Anderson, Aung, Boehm, Campo, DeWitt, Figiola, Joshi, Khounsary, Kreith, Norris, Simoeneau, Smith, Suryanarayana. *Regrets received from* Bianchi, Simons.

Old Business - Session Reports

01-IMECE Paper Standup Session: "Innovation in Heat Transfer Education - Integrating the Thermal/Fluids Curriculum", Organizers: Richard Figliola and Pam Norris.
Pam Norris served as moderator with four panelists: R. Gaggioli, Marquette; D. A. Kaminski, RPI; F. A. Kulacki, Minnesota; and, R.S. Figliola, Clemson. Attendance was very good, 32. Discussion was spirited as the topic is of interest to many faculty who are dealing with thermal sciences curriculum changes. Since *J Heat Transfer* will not consider educational topics, the organizers have been encouraged to seek publication of the panel summary, or at least provide abstracts for committee records. Program announcement for this session, HT-11B, is attached. (By committee action in 2000, this session is to be identified by the main title *Innovations in Heat Transfer Education*, followed by the subtitle specific to content.)

01-IMECE Student PosterSession: "Student Research and Design in Heat Transfer," Organizers: Ed Anderson and Ali Khounsary.
Four candidate posters were recruited, but only one student delivered: J.R. Allen, Union College (with Prof. Ann Anderson). Recruiting is a major challenge; mass mailings don't work. Recruitment seems to be driven by student's industrial supervisor if employed and/or faculty adviser. The session needs better awareness among student chapters, including an understanding of travel funding. Efforts to make participation more prestigious by the Division should be cultivated. (By committee action in 2000, this session is to be identified by the main title shown above.)

02-IMECE Paper Standup Session: "Innovation in Heat Transfer Education - Microscale Heat Transfer", Organizers: Allen Duncan and Andrew Smith. Panel Format.

02-IMECE Student Poster Session: "Student Research and Design in Heat Transfer," Organizers: Ann Anderson and Himanshu Joshi.

Other Old Business - No Reports

Sub-Committee Assignments. Seeking to give the committee structure for the conduct of present activities, the following assignments were kindly accepted during the 99-IMECE meeting:

Pam Norris, Stand-up Session (resource person)
Terry Simon, Student Poster Session (resource person)
H. Joshi, Industrial-Application Problems for the Classroom (chair)

New Business
Session Organizers. Seeking volunteers for organizing Stand-up and Student poster sessions in 2003, and beyond!

K-5, Executive Committee Report. Larry Witte reported on the action by K-5 to give the Education Committee permanent status and the designation of K-21. Additionally he reported on new rules about appointments of technical editors, the desirability of posting by-laws and committee actions on the web, and formation of the Council of Past Chairs as a means for improving influence on the Society's upper management. These matters and others are summarized in the K-5 Committee minutes of 16 November 2001.

New Officers for02-05. Results of e-mail election conducted by the Chair, the officers for a three-year period beginning Jan 2002 are: Chair - Pam Norris, University of Virginia, and Vice Chair – Ann Anderson, Union College. Dave DeWitt agreed to serve as secretary. Elections for chair are scheduled for March 2005.

Fulfilling Organizational Requirements Expected of an HTD Permanent Committee. As 0f 2002, the committee is organized and staffed in accordance with HTD's expectations. Items for future discussions in future meetings include establishing by-laws and a membership roster.

Presentations on Topics of Special Interest to the Committee
Frank Kulacki, University of Minnesota – Thermal science curriculum issues
Reported on his efforts to develop a fully online course entitled Heat Transfer and Fluid Flow (ME 3322) beginning January 2002. The course announcement, including a brief overview of topics, is provided as an attachment to the minutes.

Win Aung, NSF and General Secretary, iNEER/ICEE-ISC – *International engineering education and research: recent developments.*
The purpose of the International Network for Engineering Education and Research (iNEER) is to help advance engineering education and research in regions around the world through international linkages and cooperative partnerships. Win provided an overview of the organization and his key role in promoting the goals, and suggested we explore how to link our university programs with those at foreign schools. Realignment of NSF to promote internationalization was described. The front page of the web site, www.ineer.org, is attached to the minutes.

Attachments (4 pp)

Prof. David P. DeWitt, Secretary
School of Mechanical Engineering, Purdue University
e-mail: dpd@purdue.edu

Attachment
01-IMECE Student Poster Session

THURSDAY, 9:00 AM-12:00 NOON **Foyer Area, 3rd Fl., Hilton**

HT-8E: HEAT TRANSFER POSTER SESSION—I

MULTISCALE TRANSPORT PHENOMENA IN ENERGY SYSTEMS

Sponsored by the K-6 Energy Systems Committee of the Heat Transfer Division

Chair: **A. G. FEDOROV**, Georgia Institute of Technology
Co-Chair: **F. M. GERNER**, University of Cincinnati

(Book Number I00529 Vol. 4)

Heat and Charge Conductivities in Superlattices - Two-Scale Measuring and Modeling (3-1)—V. S. TRAVKIN, I. CATTON, University of California at Los Angeles

Exact Closure of Hierarchical VAT Capillary Thermo-Convective Problem for Turbulent and Laminar Regimes (3-2)—K. HU, V. S. TRAVKIN, I. CATTON, University of California at Los Angeles

Thermocapillary Convection with Undeformable Flat or Curved Surface in Open Cylinders (3-3)—B. C. SIM, A. ZEBIB, Rutgers University

Theoretical Study of Electrohydrodynamic Conduction Pumping (3-4)—S. I. JEONG, J. SEYED-YAGOOBI, Texas A&M University

INVERSE PROBLEMS

Sponsored by the K-12 and K-20 Committees of the Heat Transfer Division

Chair: **B. F. BLACKWELL**, Sandia National Laboratories
Co-Chair: **K. A. WOODBURY**, University of Alabama

Co-Chair: **G. S. DULIKRAVICH**, University of Texas at Arlington

(Book Number I00530 Vol. 5)

Reconstruction of the Temperature Profile Along an Optical Fiber Thermometer (3-5)—M. R. JONES, Brigham Young University

Geometric Optimization of Radiative Enclosures through Non-Linear Programming (3-6)—K. J. DAUN, J. R. HOWELL, D. P. MOON, University of Texas

Validation of Thermal Models: An Inverse Approach (3-7)—K. J. DOWDING, Sandia National Laboratories

Inverse Determination of Steady Surface Temperatures and Heat Fluxes on Arbitrary 3-D Objects (3-8)—B. H. DENNIS, G. S. DULIKRAVICH, University of Texas at Arlington

STUDENT HEAT TRANSFER RESEARCH AND DESIGN

Sponsored by the Heat Transfer Education Committee of the Heat Transfer Division

Chair: **E. E. ANDERSON**, Texas Tech University
Co-Chair: **A. KHOUNSARY**, Argonne National Laboratory

Design and Development of a Jet Impingment Facility for Experimental Studies (3-9)—J. R. ALLEN, A. M. ANDERSON, Union College

ENVIRONMENTAL HEAT TRANSFER

Sponsored by the K-19 Environmental Heat Transfer Committee of the Heat Transfer Division

Chair: **J. A. LIBURDY**, Oregon State University
(Book Number I00530 Vol. 5)

Removal of Contaminants by Induced Air Flow Inside Structures (3-10)—G. ZISKIND, Ben-Gurion University of the Negev, Israel

Numerical Modeling of Air Temperature and Velocity in Forced and Free Ventilation Piggery (3-11)—R. R. MOSSAD, University of Southern Queensland, Australia

CURRENT TRENDS/CHALLENGES IN THE THERMAL MANAGEMENT OF ELECTRONIC SYSTEMS

Sponsored by the K16-Heat Transfer in Electronic Equipment Committee of the Heat Transfer Division

Chair: **M. J. ELLSWORTH, JR.**, IBM Corporation
Co-Chair: **K. K. SIKKA**, IBM Corporation

(Book Number I00532 Vol. 7)

Performance Evaluation of Serrated Plate Fins for Under-Carriage Electronics Cooling in Transportation Applications (3-12)—I. K. SHWAISH, J. Y. MURTHY, C. B. AMON, D. BAINS, Bonabardler Transportation

An Assessment of the Impact of Interconnect Strategies on Thermal Performance of GaAs Power Amplifier IC Devices (3-13)—V. H. ADAMS, T. LEE, Motorola, Inc.

Thermal Design Analysis of Free Space Optical Interconnect (FSOI) Package Module (3-14)—V. A. CHIRIAC, T. LEE, Motorola, Inc.

Design of Generator Acoustic Blankets and its Impact on Generator Performance (3-15)—W. TONG, GE Power Systems

Attachment
01-IMECE Standup Paper Session

THURSDAY, 3:45 PM-5:15 PM **Sutton North, 2nd Fl., Hilton**

HT-11B: INNOVATIONS IN HEAT TRANSFER EDUCATION—INTEGRATING THE THERMAL/FLUIDS CURRICULUM

Sponsored by the Heat Transfer Education Committee of the Heat Transfer Division

Chair: **R. S. FIGLIOLA**, Clemson University
Co-Chair: **P. NORRIS**, University of Virginia

3:45 PM

Introduction to Thermofluids—a First Course for Engineering Students in all Curricula—R. GAGGIOLI, Marquette University

4:08 PM

An Integrated Thermal Fluids Curriculum—Advantages of Change—D. A. KAMINSKI, Renssaeler Polytechnic Institute

4:31 PM

Course Consolidation in Fluid Mechanics and Heat Transfer—F. A. KULACKI, University of Minnesota

4:54 PM

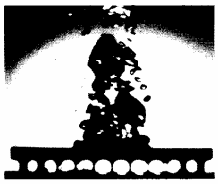
Survey Results on Current Curricula in Thermal Fluids within ME Programs—R. S. FIGLIOLA, Clemson University

UNIVERSITY OF MINNESOTA

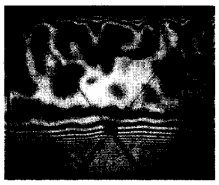
Heat Transfer and Fluid Flow (ME 3322)

spring semester 2002

A new fully online course in Mechanical Engineering from the University of Minnesota, taught by Professor Frank A. Kulacki



Cooling by boiling on a micro-electromechanical (MEMs) device. (Laboratory for Thermal Management of Electronics, University of Minnesota, 2000)



Turbulent free convection in a horizontal fluid layer with internal heat sources. (Thermodynamics and Heat Transfer Laboratory, University of Minnesota, 1971)

Here's an essential course for many branches of engineering, being delivered for the first time fully online from the University of Minnesota, by one of the top 10 mechanical engineering departments in the United States. Many students will find the flexibility, convenience, and resources of Web-based learning fit their needs:

- Engineering undergraduates who need a flexible study schedule or who cannot attend campus-based classes
- Returning graduate students who need a review of the fundamentals of heat transfer and fluid flow
- Practicing engineering professionals who need background in heat and fluids
- Degreed engineers who are preparing for Fundamentals of Engineering and Professional Engineering licensure exams

Mechanical Engineering Professor Frank Kulacki, who has 30 years of research and teaching in heat transfer engineering and science, delivers outstanding slide lectures via QuickTime® technology on the Web, and students complete assignments and tests using flexible study schedules. Other online features will include direct contact with the senior faculty member; threaded discussions; postings of student work for peer review; and Web resources such as a glossary, an equation library, a set of case studies; and utilities including a computational engine, and data sets.

The principles and topical materials of Heat Transfer and Fluid Flow are pervasive in every branch of mechanical engineering and other fields of engineering. Heat Transfer and Fluid Flow is known as one of the most demanding courses in the mechanical engineering curriculum. Now with online delivery of course modules students will be able to conveniently review difficult concepts and scan ahead for key points. Study times are flexible and the location is your home, office, or other computer workstation.

Course Information

ME 3322, Heat Transfer and Fluid Flow, 4 credits
Professor Frank A. Kulacki, Ph.D., University of Minnesota
Course administered by Independent and Distance Learning, College of Continuing Education, University of Minnesota

Prerequisites

Upper division course work, including Engineering Thermodynamics or an equivalent thermodynamics course and differential calculus.

Course Description

4 credits

Mechanisms of heat transfer: conduction, radiation, convection, and phase change. Fluid flow: mass and momentum conservation laws, statics, inviscid model, and Bernoulli's equation. Convection: external and internal flows, heat transfer coefficient, forced and natural convection, heat exchangers. Phase change: boiling and condensation. Grade basis: A-F only.

COLLEGE OF CONTINUING EDUCATION

Topics

1. Foundations of Heat Transfer and Fluid Mechanics
2. Fluid Statics
3. Heat Conduction
4. Ideal Fluids
5. Control Volume Analysis
6. External Viscous Flow
7. External Forced Convection
8. Dimensional Analysis
9. Internal Viscous Flows
10. Internal Viscous Flow and Heat Transfer
11. Heat Exchangers
12. Free and Mixed Convection
13. Thermal Radiation
14. Special Topics

The University of Minnesota is an equal opportunity educator and employer.

Class Schedule

Spring Semester 2002, January 22—May 18, 2002. Course will be fully online with weekly assignments and activities.

How to Register

Register from November 12, 2001, to January 15, 2002.

Visit Independent and Distance Learning at **http://www.idl.umn.edu** and click on "how to enroll." Be sure to enter this information in your registration form:

Class number	Grade basis	Units (credits)	Subject, catalog no., section
63748	A-F	4	ME 3322, Sec. A01

Costs

Tuition for 4 credits plus University fees and IDL course fee: $802.80
(Additional fees are assessed to students who are admitted to degree programs at the University of Minnesota).

Plus textbooks:
J. P. Holman. *Heat Transfer,* 8th Edition (Selected Chapters). McGraw Hill-Primus Custom Publishing Co.

F. M. White. *Fluid Mechanics,* (Selected Chapters). McGraw-Hill-Primus Custom Publishing Co.

Financial Aid

University of Minnesota admitted students: regular financial aid programs administered by the OSF apply to this term-based, online course.

Students not admitted to a University of Minnesota degree program: some financial aid opportunities may be available. Please visit **http://www.cce.umn.edu/sss/site_index.shtml** and click on "Financial Aid" for information.

Computer Requirements and Skills

This course is taught entirely online with no in-person meetings. You receive online audio lectures with slides, and participate in assignments, tests, and class interactions online. Study times are flexible because discussions and dialog are via an "asynchronous" online bulletin board.

You'll need daily access to the Web, speakers, a printer, Microsoft Word and a spreadsheet application. Modem users must have 56.6 speed; a direct Internet connection is better. See **http://webct.umn.edu/computer/computer.shtml** for basic computer requirements.

Please note that this course does not provide computer training. Students are expected to be skilled in Web browsing, electronic file management, word processing, spreadsheet based computing, and basic programming skills, e.g., FORTRAN or C. Students should become familiar with Engineering Equation Solver (EES, included with textbooks) as a major problem-solving tool for this course.

Course Administration

If you have questions about how to register or other questions about taking a University of Minnesota course through Independent and Distance Learning, please contact the student information staff at **612-624-4000** or **800-234-6564**, or send an e-mail to **adv@cce.umn.edu.** Information is also available at the IDL Web site: **http://www.cce.umn.edu/idl.**