Progress in Engineering Heat Transfer

Proceedings of the Third Baltic Heat Transfer Conference

EDITORS:

Brunon J. Grochal,
Institute of Fluid-Flow Machinery of PAS, Gdańsk, Poland

Jaroslaw Mikielewicz,
Institute of Fluid-Flow Machinery of PAS, Gdańsk, Poland

Bengt Sundén,
Lund Institute of Technology, Lund, Sweden

Institute of Fluid-Flow Machinery Publishers
Gdańsk, Poland
CONTENTS

1. Combustion and radiation

Comparative studies of different mathematical models of very short laser pulse energy absorption by solids
M. Jaworski, R. Domanski

Influence of thermal radiation from the burned zone on heat transfer in the piston of diesel engine
P. Furmanski, J. Banaszek, T. S. Wisniewski, M. Rebow

Method of determination of radiative properties of some thermal insulations
P. Furmanski, T. S. Wisniewski

Thermal analysis of the end gas in SI engines by a simplified two-dimensional model
S. Hajireza, F. Mauss, B. Sundén

Tube wall emissivity in CFB boilers
K. Kardos, B. Sundén

Numerical modelling of the coal combustion processes in a vortex furnace
D.V. Krasinsky

Heat exchange in devices of pulse burning
H. Mere, V. Dushenko

Regularities of the unsteady radiation-conduction heat transfer in the evaporating spherical volume of the semitransparent material
G. Miliauskas, R. Montvilas, P. Švenčianas

Calculation of the temperature field in a nonisothermal gas filled enclosure, using irradiation factors determined by means of the Monte Carlo method
Z. Rudnicki

On steam temperature drop at NO\textsubscript{x} reduction
A. Šlančiauskas, R. Šležas

Modelling of gas to droplets radiative exchange
S. Sazhin, E. Sazhina, M. Heikal

Low frequency sonic field influence to the heat transfer in combustion chamber
T. Tiikma, A. Vrager
The complex method for investigation of thermophysical properties of kraft recovery boiler fireside deposits
T. Tiikma, H. Tran

Heat transfer in plasma jet reactor for hazardous waste treatment
V. Valincius, R. Kezelis, R. Juskevicius

Electric field forced heat and mass transfer in the flame channel flows
M. Zake, D. Turlajs, M. Purmals

2. Conduction

Transient heat transfer between plate and particle in contact
B. J. Grochal

Numerical and experimental determination of unsteady temperature and thermal stress fields in on-line mode
A. Guzik, T. Styrylska

Heat transfer analysis of a bevelled blade in a pigment coating process
M. Hyensjö, B. Sundén, D. Eklund

Determination of the heat transfer coefficient of construction elements for existing buildings
A. Jakovics, S. Gendelis, Z. Krievans

Heat transfer through a porous layer filled with near-critical medium
R. Kruus, H. Kåär, T. Tiikma

Heat conduction in paper during calendering, a numerical calculation
Ch.-H. Luong, P.E. Lindem, M. Lamvik

Model of transient heat transfer in packed bed - theory and experiment
S. Polesek-Karczewska

A new method of measurement of thermal contact conductance in metal forming operations
T. S. Wiśniewski, M. Rosochowska, K. Chodnikiewicz

Error of measurement thermal conductivity of low alloy high-speed steels by the quasi-stationary method
F. Wolańczyk
3. Convection

The influence of thermal boundary conditions on mixed convection heat transfer in vertical tubes (invited)
J. D. Jackson, J. Li, P. An

New approaches to modelling of impinging jets (invited)
J. Mikielewicz, D. Mikielewicz

Computational heat transfer (invited)
B. Sundén

Heat transfer by a pulsating flow in the thermally developing region of a pipe
L. Ainola, A. Ekholm, T. Koppel, M. Lahdeniemi

Convective heat transfer to rough rotating disks
B. P. Axcell, C. Thianpong

Natural circulation of thermal diode heated simultaneously from below and symmetrically from the sides
H. Bielinski, D. Mikielewicz, J. Mikielewicz

Influence of presence of the immovable baffles inside a rotor on convective mass/heat transfer coefficient for a regenerator with considering the body forces
B. Bieniasz

Electroconvective heat transfer in tubes
M. K. Bologa, I. A. Kozhukhar, T. V. Ursu, I. V. Cojevnicov

Finite element analysis of convection in spatially periodic banks of tubes
G. Croce, C. Nonino

A comparison of direct numerical simulation and turbulence models for liquid metal free convection in volumetrically heated enclosures
I. Di Piazza, M. Ciofalo

Heat transfer generalization after a turbulent separation
E. Epik

Numerical analysis of yttrium distribution in BaO-CuO melt during Y123 crystal growth by Czochralski method
K. Gajek, J. S. Szymyrd

A numerical study of convective heat transfer in a test heat storage unit
J. Gościk, S. Gumkowski
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat transfer measurement from an oblique impinging jet on a flat plate using liquid crystal</td>
<td>327</td>
</tr>
<tr>
<td>S. Gumkowski, M. Wierzbowski, J. Stasiek</td>
<td></td>
</tr>
<tr>
<td>Natural convection and heat and mass transfer calculation by the finite element technique</td>
<td>333</td>
</tr>
<tr>
<td>M. B. Ivanov</td>
<td></td>
</tr>
<tr>
<td>An analysis of buoyancy driven convection in vertical cylinder</td>
<td>341</td>
</tr>
<tr>
<td>M. Jaszczur, J. S. Szmyd</td>
<td></td>
</tr>
<tr>
<td>The external disturbance method to measure heat and momentum transfer in mixing layer</td>
<td>349</td>
</tr>
<tr>
<td>A. Jazdauskas, R. Śležas</td>
<td></td>
</tr>
<tr>
<td>Flows in a circular cylinder heated from rotating bottom</td>
<td>357</td>
</tr>
<tr>
<td>J. W. Kim</td>
<td></td>
</tr>
<tr>
<td>Thermomagnetic convection of ferrofluid in a flat layer</td>
<td>367</td>
</tr>
<tr>
<td>G. Kronkalns, E. Blums, M. Maiorov, A. Mezulis</td>
<td></td>
</tr>
<tr>
<td>Natural convection heat transfer from isothermal vertical round plate</td>
<td>377</td>
</tr>
<tr>
<td>W. M. Lewandowski, E. Radziemska</td>
<td></td>
</tr>
<tr>
<td>On the features of turbulent transfer of heat and mass in air density stratified flow of the atmospheric surface layer</td>
<td>383</td>
</tr>
<tr>
<td>I. Litvina, A.. Litvin, E. S. Takle</td>
<td></td>
</tr>
<tr>
<td>Numerical investigation of turbulent flow and heat transfer in channel with ribs</td>
<td>391</td>
</tr>
<tr>
<td>L. Myllerup, P. S. Larsen</td>
<td></td>
</tr>
<tr>
<td>Local heat transfer in an in-line tube bundle with asymmetrical flow</td>
<td>399</td>
</tr>
<tr>
<td>K. E. Meyer</td>
<td></td>
</tr>
<tr>
<td>Effects of surface with regular roughness on convective heat transfer</td>
<td>407</td>
</tr>
<tr>
<td>D. Neshumajev, T. Tiikma, O. Träss</td>
<td></td>
</tr>
<tr>
<td>Comparisons of finite element solutions for the chimney effect between heated parallel plates</td>
<td>415</td>
</tr>
<tr>
<td>C. Nonino, G. Lorenzini, M. Manzan</td>
<td></td>
</tr>
<tr>
<td>Effect of air release from heated water on pressure losses and convective heat transfer in a pipe flow</td>
<td>423</td>
</tr>
<tr>
<td>J. Wojtkowiak, Cz. Oleśkowicz-Popiel</td>
<td></td>
</tr>
</tbody>
</table>
Hydrodynamics of air flow-rate and velocity standards
A. Pedisius, J. Tonkonogij, G. Aidukas

Investigation of heat and mass transfer processes in a boundary layer with injection
L. N. Perepechko

Thermal stability of two porous layers separated by a thermal barrier
A. Postelnicu

Transient heat transfer from concave wall of the curved channel
P. Poškas, V. Ragaišis, V. Šimonis

Natural convective heat transfer from downward-facing horizontal round plate
E. Radziemska, W. M. Lewandowski

Local heat transfer coefficients on a rectangular plate with varying orientation
C. Ramirez, D. B. Murray, J. A. Fitzpatrick

The characteristics of a thermal boundary layer in the presence of bypass laminar-turbulent transition
T. Suprun

State-of-the-art codes validation by Elektrogorsk 108 test facility experimental data
R. Urbonas, E. Uspuras, A. Kaliatka

Thermal-hydraulic analysis of local flow stagnations and strategy development for its destruction
J. Vilemas, E. Uspuras, A. Kaliatka

Electrolytic research of convective heat/mass transfer in radially rotating circular ducts of the high-speed exchanger’s rotor
J. Wilk

4. Heat exchangers

Investigations on the maximum inner wall temperature in a steam heated tube with natural circulation for the use in biotechnology
A. Baars, F. Werner, A. Delgado

Theoretical analysis of cross-flow heat exchangers with alternating flow directions in tubes
T. Bes
Heat transfer and hydraulic resistance in rod bundles with wire-wrapped tubes
B. Cesna

Plate fin-and-tube heat exchangers: A literature survey of heat transfer and friction correlations
D. Eriksson, B. Sundén

A new cooling strategy for a gasoline engine
S. Etemad

Shallow and deep vertical geothermal heat exchangers as lower source of heat pumps
T. Kujawa, W. Nowak

Flow and heat transfer in passages with multiple V-ribbed walls
C. O. Olsson

Consideration of maldistribution in heat exchangers using the hyperbolic dispersion model
W. Roetzel, J. Chakkrit Na Ranong

Prediction of thermal-hydraulic characteristics of square-sectioned ribbed ducts using an explicit algebraic stress model and low-Re number turbulence model
A. Saidi, B. Sundén

Enhanced Wilson plot technique for obtaining heat exchanger design data
T. Styrylska, A. Lechowska

Design of heat exchanger networks using multi-stream plate-fin heat exchangers
L. Wang, B. Sundén

A single blow test for a wavy-perforated plate-and-fin surface considering non-uniform thermal compactness
H. Zhang, Y. Xuan, W. Roetzel

5. Multiphase heat transfer

Heat transfer crisis in vertical steam-generating channels in absence of the coolant circulation
S. B. Alexeev, S. V. Svetlov, Ju. N. Ilyukhin, V. O. Kuhtevich, V. G. Sidorov

The use of second gradient theory for the description of flashing water flow
J. Badur, M. Banaszkiewicz, C. Vortmann
Bubble boiling of environment-friendly refrigerating media
*T. Bohdal*

An evaluation of film condensation on horizontal tube with condensate drainage
*D. Butrymowicz, M. Trela, J. Karwacki*

Modelling of phase 'B' of thermal explosions occurring in different conditions
*T. R. Fodemski, A. Rosiak*

A drying processes of lacquer coating in wood manufacturing industry - simulations and experiments
*R. Garcia-Padron, D. Loyd*

Heat transfer under the static stable foam flow
*J. Gylys, A. Daugele, M. Jakubcionis, S. Sinkunas*

Transient two-phase flow with heat transfer described by the relaxation model
*R. Kwidziński, Z. Bilicki, A. Rasmus*

3D numerical simulation of film cooling with fan-shaped holes on a flat plate
*P. Laletin, B. Weigand, M. Bettelini, J. von Wolfersdorf*

A new description of bubbly flow within the boundary layer in comparison against a modified Bankoff model
*D. Mikielewicz*

Temperature profile in tube wall by rapid water quenching
*A. Ots*

Heat transfer modelling of solar radiated soil, including moisture transfer
*S. Sjökvist, R. Garcia-Padron, D. Loyd*

Visualisation of bubble growth using particle image velocimetry
*A. Szymczyk, J. T. Cieslinski, H. Meironke*

Conditions for appearance of the droplet structure for benzene
*Z. Zapałłowicz*

---

6. Miscellanea

Heat flux measurements (review) *(invited)*
*Cz. O. Popiel*
The use of thermochromic liquid crystals and image processing for technical and biomedical thermography (invited)

J. Stąsiek, M. Ciofalo, G. Tanda, S. Klosowicz, J. Żmija, B. Kalicki

Some heat and mass transfer problems related to the measurements of a Soret effect in ferrofluids

E. Blums, A. Mezulis, A. Bourdon

Mathematical modeling of the heat and mass transfer processes in human lungs

E. D. Fedorovich, V. A. Talalov, V. B. Serikov

Interaction between unstationary temperature gradient and diffusion of metal vapour in porous material

V. Frishfelds, A. Jakovics, I. Madzhulis

Heat transfer in ageing process of electroluminescence display

R. Karvinen, P. Pekkanen

Conditions for thermal comfort in helium-oxygen saturation diving

T. Kozak, A. Majchrzycka

The measurement of heat losses to the environment with two techniques

T. Orzechowski, M. E. Poniewski

Drying of wood waste by forced convection using sun and wind energy

A. Skrinska, E. Miliukas, N. Vegyte

Tables of thermal comfort under normobaric conditions

A. Stachel

Ways of minimization of power losses and features of systems of maintenance of thermal modes of hydrogen-oxygen generators

M. Verdiev, T. Ismailov, B. Usufov, E. Fedorovich

Author’s Index

809