



ASME International



**CHT-04: 3rd ICHMT SYMPOSIUM**  
**on**  
**ADVANCES IN COMPUTATIONAL HEAT TRANSFER**  
**MS Midnatsol, Norwegian Coastal Voyage**

April 19-24, 2004

Co-chairs: Graham de Vahl Davis and Eddie Leonardi

**Summary:** CHT-04 took place on the Hurtigruten Coastal Steamer *MS Midnatsol* during its voyage down the Norwegian coast between Kirkenes and Bergen, Norway. The weather was, of course, cold – Kirkenes is at 70° N latitude – but was generally fine and the venue provided opportunities for both professional interaction and tourism. The symposium was co-sponsored by the International Centre for Heat and Mass Transfer and the CFD Research Laboratory, UNSW, and was financially supported by Bentours International Pty. Ltd., the travel agency which made all ship reservations and some internal travel in Norway. It received the approval of (but no financial support from) AFTES and the Heat Transfer Division of ASME.



CHT-04 was a scientific, social and financial success.



**Conference facilities:** MS Midnatsol is a new ship, having entered service in April 2003, and is ideal for hosting a conference. It can accommodate over 600 passengers and is equipped with a variety of public areas and panoramic lounges, a gym, saunas, Internet café, and first-class conference facilities including a 200-seat auditorium with A/V equipment and two small rooms which were used for the poster sessions. The shipping company allocated a crew member for the duration of the symposium to ensure that everything operated satisfactorily.

One advantage of having a symposium on board a ship – especially on the Norwegian Coastal Voyage – is that delegates are less tempted to arrive late or leave early.

**Technical program:** The programme featured eight invited keynote papers, three invited speakers at a Computational Combustion mini-symposium, two invited speakers at a Verification & Validation panel discussion and 95 contributed papers.

The invited keynote papers were:

- Professor Lars Davidson, Dept of Thermo and Fluid Dynamics, Chalmers University of Technology, Sweden lada@tfd.chalmers.se  
*Hybrid LES-RANS: an approach to make LES applicable at high Reynolds number*
- Professor David Gosman, ThermoFluids Section, Mechanical Engineering Department, Imperial College, London d.gosman@ic.ac.uk  
*Status of industrial thermo-fluids analysis with CFD*
- Professor Johannes Janicka, Institute for Energy and Powerplant Technology, TU Darmstadt, Germany. janicka@ekt.tu-darmstadt.de  
*Unsteady methods (URANS and LES) for the simulation of combustions systems*
- Dr Patrick Le Quéré, Mechanical Engineering Department, Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur (LIMSI), France plq@limsi.fr  
*Recent progress in the determination of hydrodynamic instabilities for natural convection flows*
- Professor Brian Milton, School of Mech. and Manuf. Engineering, University of NSW, Sydney, Australia b.milton@unsw.edu.au  
*Pulsed, supersonic liquid jets - their characteristics and potential for improved fuel injection*
- Dr Akshai K. Runchal, Analytic & Computational Research Inc., Bel Air, CA, USA runchal@ACRiCFD.com  
*Computational simulation of complex problems: Promises & Pitfalls*
- Professor Wen Quan Tao, Xi'an Jiaotong University, Xi'an, China. wqtao@mail.xjtu.edu.cn  
*Recent advances in finite volume methods*
- Dr Alexander Zhmakin, SoftImpact Ltd., St. Petersburg, Russia ai@softimpact.ru  
*Heat transfer problems in crystal growth*



The invited Computational Combustion mini-symposium papers were:

- Professor Mitchell D. Smooke, Department of Mechanical Engineering, Yale University, USA.  
*Computational and Experimental Study of Laminar Flames.*
- Professor Ashwani K. Kapila, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, USA.  
*Detonation Initiation: Modelling, Computation and Mechanisms.*  
(co-authored by D.W. Schwendeman)
- Dr Vincent Giovangigli, Centre de Mathématiques Appliquées, École Polytechnique, Palaiseau, France.  
*Multicomponent Transport and Sprays.*

The moderator was Moshe Matalon, McCormick School of Engineering and Applied Science, Northwestern University, USA.

The invited Verification & Validation papers were:

- Professor Fred Stern, University of Iowa, USA  
*Quantitative approach for V&V of CFD simulations and certification of CFD codes with examples*
- Professor Christopher J. Roy, Auburn University, USA  
*Verification of codes and solutions in computational simulation*

All contributed papers were given as poster presentations.

Invited papers were not reviewed. Contributed papers were selected on the basis of extended (three to four page) abstracts.

The full programme is given in Appendix I.

**Proceedings:** Because of the logistical difficulties associated with producing a book of Proceedings and transporting over 100 copies to Kirkenes, the proceedings were produced on a CD-ROM which was given an ISBN number (1-5670-174-2), copied at ICHMT by Professor Arinç and his staff and published by Begell House. The CDs were distributed at the Symposium. Copies may

be ordered from [Graham de Vahl Davis](#). A book of abstracts was also produced, printed at ICHMT and distributed at the Symposium.

Arrangements were made with the editors of seven relevant journals (Combustion Theory and Modelling; Heat Transfer Engineering; International Journal of Computational Fluid Dynamics; International Journal of Heat and Fluid Flow; International Journal for Numerical Methods in Fluids; International Journal of Thermal Sciences; and Numerical Heat Transfer) to publish selected papers in special or regular issues. They have been submitted and subjected to the journals' normal reviewing processes.

**Attendance:** 114 delegates attended. In addition, there were 47 accompanying persons (including a baby who celebrated his first birthday during the Symposium). The distribution of the delegates by country was:

Algeria	1	Germany	8	Norway	2	Sweden	2
Australia	8	Hong Kong	3	Poland	4	Switzerland	1
Brazil	1	Israel	2	Portugal	3	Taiwan	4
Canada	5	Italy	5	Romania	1	Thailand	1
China	4	Japan	5	Russia	8	Turkey	2
Croatia	1	Korea	10	S. Africa	1	UK	4
Czech Rep.	2	Netherlands	2	Singapore	2	USA	12
France	7	New Zealand	1	Spain	2		

**Excursions:** The ship visited several ports each day, allowing accompanying persons (and some delegates!) to go ashore for short periods. An excursion on the Wednesday afternoon, when no sessions were scheduled, allowed delegates and guests to take a bus trip past the beautiful Lofoten Islands.



# APPENDIX I

## CHT-04 Detailed programme

The Conference Centre is on Deck 5. All keynote and invited lectures, as well as the Opening and Closing sessions, will be held in the Amphitheatre. Poster sessions will be in Conference rooms Sol and Stjerne, located on either side of the Amphitheatre, on the starboard and port sides of Midnatsol respectively.

### Monday 19 April

12.45 pm: Depart Kirkenes  
3-5 pm: Registration, Conference area, Deck 5  
5-7 pm: Welcome reception  
7-9 pm: Dinner

### Tuesday 20 April

**8.30-9 am: Opening session. Chair: Graham de Vahl Davis**

**9-11 am: Session 1. Chair: Eddie Leonardi**

Keynote lecture: *Dr Akshai K. Runchal, ACRi CFD Inc., Bel Air, CA, USA.*  
Computational Simulation of Complex Problems: Promises & Pitfalls

Keynote lecture: *Professor David Gosman, Imperial College, London, UK*  
Status of industrial thermofluids analysis with CFD

11.15 am – 12.45 pm: Shore excursion in Hammerfest (optional; no charge)

1-2 pm: Lunch

**2 – 4.30 pm: Poster session 1:**

#### Verification and validation (Sol)

- 172 Spectral element benchmark simulations of natural convection in two-dimensional cavities  
*Thor Gjesdal, Carl Erik Wasberg, B. Anders Pettersson Reif*
- 179 Verification and validation of EFD.LAB code for predicting heat and fluid flow  
*V. Balakin, A. Churbanov, V. Gavrioliouk, M. Makarov, A. Pavlov*
- 229 Extension to the CHT-01 natural convection benchmark problem to non-Newtonian fluids  
*William T. Barth, Graham F. Carey*

#### Computational and mathematical methods (Group 1: Sol)

- 132 Sensitivity analysis for thermal design and monitoring problems of refractories  
*Karstein Sorli, Inge Morten Skaar*
- 151 Evolution of liquid meniscus shape in a capillary tube  
*S.L. Lee, H.D. Lee*
- 170 Sensitivity analysis of the temperature-velocity coupling of heat convection  
*Ireneusz Szczygiel*
- 173 Solving transient nonlinear heat conduction problems by proper orthogonal decomposition and FEM  
*Adam Fic, Ryszard A. Bialecki, Alain J. Kassab*
- 201 An object oriented formulation for unsteady 3D heat transfer  
*Christopher Paolini, Kyoung H. Yeo, Subrata Bhattacharjee*
- 204 Prediction of low mach number flows using quasi gas dynamic system of equations  
*Boris Cheverushkin, Natalia Churbanova, Marina Trapeznikova*

#### Computational and mathematical methods (Group 2: Stjerne)

- 211 A lattice Boltzmann kinetic model for micro flow and heat transfer  
*X. D. Niu, Y. T. Chew, C. Shu*
- 212 Application of artificial neural network and genetic algorithm to optimization of design parameters in compartment fire  
*Richard K.K. Yuen, Eric W.M. Lee, W.K. Kwok, Sherman C.P. Cheung, G. H. Yeoh*
- 215 The Marangoni convection explanation: a two-point theory (TPT) of mass and heat transfer and new Laplace equation approach.  
*M. D. Staicovici, D. Isvoranu*
- 221 Contribution to elliptic relaxation modelling of turbulent natural and mixed convection  
*S. Kenjereš, S. B. Gunarjo, K. Hanjalić*
- 223 Efficiency improvements of electromagnetic flow control  
*Evan Spong, John Reizes and Eddie Leonardi*
- 228 Three-dimensional lattice Boltzmann BGK model and its application to flows with heat transfer in a rectangular microchannel  
*Y. T. Chew, X. D. Niu, C. Shu*
- 244 Fluid-structure interaction in internal flows: coupled numerical simulation  
*F. Stella, P. Gaudenzi, M. Giangì, F. Paglia, A. Casata, D. Simone*
- 254 Method of lines solution for transient turbulent flow in a heated pipe  
*Ahmet B. Uygur, Tanil Tarhan, Nevin Selçuk*
- 261 A new method for numerical treatment of diffusion coefficients at control volume surfaces  
*Liu Zhongliang, Ma Chongfang*
- 262 Volumetric methods for evaluating irreversible energy losses and entropy production with application to bioengineering flows  
*Gordon Mallinson, Keri Moyle, Stuart Norris*

**4.30 – 7 pm: Session 2: Verification and Validation. Chair: Graham de Vahl Davis**

Invited lecture: *Professor Fred Stern, University of Iowa, USA*  
Quantitative approach for V&V of CFD simulations and certification of CFD codes with examples

Invited lecture: Professor Christopher J. Roy, Auburn University, USA  
Verification of codes and solutions in computational simulation

6-7 pm: Panel discussion on Verification and Validation

7-9 pm: Dinner

**Wednesday 21 April**

**8.30-9.30 am: Session 3. Chair: Kemo Hanjalić**

Keynote lecture: *Dr Lars Davidson, Chalmers University of Technology, Sweden*  
Hybrid LES-RANS: an approach to make LES applicable at high Reynolds number

**9.30 am-12.30 pm: Poster session 2**

**Forced convection (Sol)**

- 106 Numerical simulation of transient cooling effect with wall mass injection behind the backstep  
*Yue-Tzu Yang, Kuo-Teng Tsai*
- 155 Convection and radiation effects in hollow, compound optical fibers  
*J.I. Ramos*
- 161 Numerical simulation of three-dimensional separated flow and heat transfer around staggered surface-mounted rectangular blocks in a channel  
*Madoka Nakajima, Hideki Yanaoka, Hiroyuki Yoshikawa, Terukazu Ota*
- 162 Three-dimensional simulation of separated flow and heat transfer in a rectangular channel with sudden expansion  
*Hiroyuki Yoshikawa, Makoto Yoshikawa, Hideki Yanaoka, Terukazu Ota*
- 192 Heat spreading by oscillating flow in a thin channel filled with liquid  
*Su Hyeon Kim, Seo Young Kim, Byung Ha Kang*
- 195 Mass Transfer and Advance of Reattachment Point Due to the Bubble Agitation on the Backward Facing Step Flow  
*Hyuk Kwon, Dong Un Seo, Goon Cherl Park*

**Turbulence (Stjerne)**

- 103 LES computation of particle transport in rib roughened passages  
*G. Lo Iacono, P.G. Tucker*
- 112 Entropy production calculation for turbulent shear flows and their implementation in CFD codes  
*Fabian Kock, Heinz Herwig*
- 128 On the turbulence model for a centrifugal fan and the thermal performance of plate-fins fan-sink assemblies  
*Sen Yung Lee, Shueei Muh Lin, Ming Hong Lin*
- 135 Numerical analysis of experimental observations for heat transfer augmentation by ultrasonic vibration  
*Hyun Jung Kim, Ji Hwan Jeong*
- 167 Dynamics of turbulent wake with small excess momentum in stratified media  
*G.G. Chernykh, N.P. Moshkin, A.V. Fomina*
- 241 Effect of wall distance coordinate on the prediction of variable property flow with two-equation turbulence models  
*Seong Gu Baek, Seung O Park*
- 256 An investigation of a turbulent backward facing step flow with the addition of a charged particle phase  
*Stephen Hall, Graham Morrison, Masud Behnia*
- 263 Predictions of flow and heat transfer in multiple-impinging jets with an elliptic-blending second-moment closure  
*L. Thielen, K. Hanjalić, H. Jonker, R. Manceau*

1-2 pm: Lunch

**2-3.30 pm: Session 4: CyberInfrastructure Chair: Graham de Vahl Davis**

Panel discussion on Cyber Infrastructure (to be organised by Professor Darrell Pepper, University of Nevada, Las Vegas, USA)

3.30-6.30 pm: Free

6.30-9.15 pm: Shore excursion Solvør-Henningsvær-Stamsund (\$95 Bookings essential; advance notice by email to Bentours is requested to enable a suitable bus to be reserved)

7-9 pm: Dinner A late dinner will be served for those going on the shore excursion.

**Thursday 22 April**

**8.30-9.30 am: Session 5 Chair: Nevin Selçuk**

Keynote lecture: *Professor B. E. Milton, University of NSW, Australia*  
Pulsed, supersonic fuel jets - their characteristics and potential for improved Diesel engine injection.

**9.30 am-1 pm      Session 6: Combustion mini-symposium      Chair: Moshe Matalon**

- Invited lecture: *Dr Vincent Giovangigli, École Polytechnique, Palaiseau, France.*  
Multicomponent transport and sprays
- Invited lecture: *Professor A.K. Kapila, Rensselaer Polytechnic Institute, USA.*  
Detonation initiation: modelling, computation and mechanisms
- Invited lecture: *Professor Mitchell D. Smooke, Yale University, USA.*  
The transition from non-sooting to sooting coflow ethylene diffusion flames

1-2 pm: Lunch

**2-3 pm:      Session 7      Chair: Gordon Mallinson**

- Keynote lecture: *Professor Johannes Janicka, TU Darmstadt, Germany.*  
Unsteady methods (URANS and LES) for simulation of combustion systems

**3-6 pm:      Poster session 3**

**Combustion (Sol)**

- 126      CFD prediction of fire curtain influence on smoke spread in road tunnels  
*I.A. Bolodian, A.N. Borodkin, A.V. Karpov, A.A. Kosachev, A.N. Plotnikov*
- 148      Experimental and computational study of lifted turbulent diffusion flames  
*P. Mateus, A. Santos, P. J. Coelho, M. Costa*
- 198      Modelling as a supporting tool for research and development of low-NO<sub>x</sub> gas burners  
*Jiří Hájek, Vít Kermes, František Brož, Petr Stehlik, Jaroslav Oral*
- 203      The dynamics of an edge-flame in a mixing layer  
*Vadim N. Kurdyumov, Moshe Matalon*
- 224      Smoke movement under micro-gravity conditions  
*Tracie Barber, Mary D'Souza, Simon Evans*
- 232      A mathematical model for heat and mass transfer in concrete at elevated temperature due to fires  
*Richard K.K. Yuen, W. K. Kwok, S. M. Lo*
- 233      On the use of CFD in modeling combustion dynamics  
*Peter Flohr, Christian Oliver Paschereit*
- 247      Heat and mass fluxes in presence of fast exothermic superficial reaction  
*Almerinda Di Benedetto, Francesco Donsì, Francesco S. Marra, Gennaro Russo*

**Radiation (Stjerne)**

- 142      Fundamentals of a new method for the solution of the radiative transfer equation  
*P.J. Coelho*
- 152      Heat transfer in semitransparent materials, an adaptive finite element approach  
*Rainer Backofen, Angel Ribalta, Axel Voigt*
- 168      Application of the conservative discrete transfer radiation method to a furnace with complex geometry  
*Mario Baburić, Alexandre Raulot, Pedro J. Coelho, Neven Duić*
- 169      Adaptive solutions of spn-approximations to radiative heat transfer in glass  
*Axel Klar, Jens Lang, Mohammed Seaïd*
- 174      Radiative heat transfer in technical applications  
*Stefan Braun, Ingo Cremer*
- 177      Human teeth heating by laser irradiation: Experimental and simulated thermal responses  
*Carlos E. V. Paiva, Paulo D. C. Lobo, Marcio Magini*

**6-7 pm:      Session 8 - Open forum.      Chair:**

7-9 pm: Dinner

**Friday 23 April**

**8.30-9.30 am:      Session 9      Chair: Richard Yuen**

- Keynote lecture: *Professor Wen Quan Tao, Xi'an Jiaotong University, China.*  
Some recent advances in finite volume approach and their applications in the study of heat transfer enhancement

**9.30 am-12.30 pm: Poster session 4**

**Applications (Group 1: Sol)**

- 107      Numerical simulation of the performance of a capillary thermal driven ejector refrigerator  
*M.H. Shi, H. Cai, X. C. Wang*
- 124      Evaluation of thermal conduction between two subchannels with a computational fluid dynamics code  
*Hae-yong Jeong, Kwi-seok Ha, Yong-bum Lee, Dohee Hahn, F. E. Dunn, J. E. Cahalan*
- 125      A distributed resistance analogy for solid oxide fuel cells  
*Steven. B. Beale, Sergei V. Zhubrin*
- 157      A systems CFD model of a packed bed high temperature gas-cooled nuclear reactor  
*C.G. du Toit, P.G. Rousseau, G.P. Greyvenstein, W.A. Landman*
- 166      Gasoline direct injection spray simulation  
*Gino Bella, Rossella Rotondi*

- 176 Thermal analysis of vertical ground exchangers of heat pumps  
*Jan Składzień, Małgorzata Hanuszkiewicz-Drapała, Adam Fic*
- 187 Numerical study of heat transfer inside a cooling fluid in a power transformer  
*Nelu-Cristian Chereches, Nadim El Wakil, Alina Marinescu, Jacques Padet*

#### Materials and manufacturing (Stjerne)

- 156 Numerical study of the thermal degradation of isotropic and anisotropic polymeric materials  
*E. Soler, J. I. Ramos*
- 160 Inverse approach and sensitivity analysis for identification of ingot-mould thermal resistance in continuous casting of metals  
*Aleksander Nawrat, Janusz Skorek*
- 184 Numerical simulation of the filling process in domains partially filled with porous media  
*V. A. F. Costa*
- 207 The use of thermodiffusion in constituent separation in porous media: multi-domain techniques  
*R. Bennacer, A. A. Mohamad, J. Sicard*

#### Micro and nano heat transfer (Stjerne)

- 101 Heat transfer enhancement in forced convection laminar tube flow by using nanofluids  
*Sidi El Bécaye Maiga, Cong Tam Nguyen, Nicolas Galanis, Gilles Roy*
- 117 The effect of axial heat flux on the heat transfer in micro-channels  
*G. Hetsroni, I. Tiselj, B. Mavko, A. Mosyak, E. Pogrebnyak, Z. Segal*
- 121 Heat transfer enhancement in a radial flow cooling system using nanofluids  
*Samy Joseph Palm, Gilles Roy, Cong Tam Nguyen*
- 138 Pressure drop and heat transfer in a minichannel flow system involving two straight sections separated by a 90° bend  
*Patrick H. Oosthuizen*

1-2 pm: Lunch

#### 2-3 pm: Session 10 Chair: Rachid Bennacer

Keynote lecture: *Dr Patrick Le Quéré, LIMSI, France*  
Recent progress in the determination of hydrodynamic instabilities of natural convection flows

#### 3-6 pm: Poster session 5

#### Natural convection (Group 1: Sol)

- 102 Numerical simulation of non-Boussinesq effects in laminar and turbulent Rayleigh-Bénard convection of water in a perfectly conducting cubical cavity  
*Leonardo Valencia, Jordi Pallares, Ildefonso Cuesta, Francesc Xavier Grau*
- 110 Evaluation of an approximate method for predicting the u-value of a window with a between-panes louvered shade  
*D. Naylor, M. Collins*
- 123 Three dimensional numerical study of natural convective heat transfer of liquid for two heaters installed in a cubic enclosure  
*Y.L. He, W.W. Yang, W.Q. Tao*
- 137 Natural convection in a rectangular enclosure with two heated sections on the lower surface and cooled side walls  
*Patrick H. Oosthuizen*
- 139 Natural convective heat transfer in a square cavity with time-varying sidewall temperature  
*M.V. Kanashina, P.T. Zubkov, E.V. Kalabin*
- 140 Heat transfer from the cold wall of a square cavity to the hot one by oscillatory natural convection  
*M. V. Kanashina, P. T. Zubkov, E. V. Kalabin*
- 175 Non uniform boundary conditions in wall curved cavities for free convection  
*A. Sabeur-Bendehina, M. Aounallah, O. Imine, L. Adjlout*
- 225 Experimental and Numerical Study of Marangoni – Natural Convection in Shallow Liquid Layers  
*L. H. Tan, E. Leonardi, T. J Barber and S. S. Leong*

#### Natural convection (Group 2: Stjerne)

- 231 Natural convection from a heated circular cylinder in horizontal oscillations  
*C. T. Hsu, Y. Su*
- 239 Investigation of coupled thermocapillary convection to liquid/vapour transition occurring in capillary tubes  
*R. Bennacer, M. El Ganaoui, K. Sefiane, C. Buffone*
- 242 Transient Rayleigh-Bénard convection in a cylinder with an aspect ratio of 4  
*S.S. Leong*
- 260 Numerical simulation of a vertical solar collector: radiation and turbulent natural convection coupling  
*C. Muresan, C. Ménézo, R. Bennacer, R. Vaillon*

#### Mixed convection (Stjerne)

- 164 Mixed convection boundary layer flow on inclined wavy plates including the magnetic field effect  
*Cha'o-Kuang Chen*
- 188 Flow of water in a vertical cylindrical container with and without rotation under a vertical magnetic field gradient  
*Masato Akamatsu, Mitsuo Higano, Yoshio Takahashi, Hiroyuki Ozoe*
- 189 Control of heat transfer of air by the magnetizing force under gravitational and non-gravitational fields  
*Mitsuo Higano, Masato Akamatsu, Yasumasa Okazaki*
- 191 Resonance of vertical boundary layer flow by a side wall thermal oscillation in an enclosure  
*Seo Young Kim, Sung Ki Kim*

**6-7 pm: Session 11 – Open forum. Chair:**

7-9 pm: Dinner

**Saturday 24 April**

**8.30-9.30 pm: Session 12 Chair: Gad Hetsroni**

Keynote lecture: *Dr Alexander I. Zhmakin, SoftImpact Ltd., St. Petersburg, Russia*  
Heat transfer problems in crystal growth

**9.30 am-12.30 pm: Poster session 6**

**Applications (Group 2: Sol)**

- 190 A study of low-power density laser welding process with evolution of free surface  
*Eung-ji Ha, Woo-Seung Kim*
- 199 CFD based design optimisation of industrial heat transfer equipment  
*Jiří Hájek, Petr Stehlik, Jaroslav Oral*
- 200 Numerical simulation of an induction heating process in an induction skull melting furnace  
*Taide Tan, Randy Clarksean, Yitung Chen, Hsuan-Tsung Hsieh*
- 202 Heat transfer analysis of nuclear waste casks stored in the Yucca mountain repository  
*Darrell W. Pepper, Yitung Chen*
- 237 Thermal analysis of the mechanical structure of the solar telescope GREGOR  
*T. Bornkessel, M. Schäfer, J. Kühn, P. Emde*
- 238 Numeric simulation of the natural convection in a horticultural greenhouse heated from below (by the use of the CFD)  
*Nacima Tadj, Belkacem Draoui*
- 243 Heat flux evaluation for YES2 re-entry vehicle: numerical simulation  
*F. Stella, F. Paglia, M. D'Ascenzi, M. Iannuccelli*

**Solidification and melting (Stjerne)**

- 180 Investigation of facet influence on dopant distribution at semiconductor crystal growth.  
*S.V. Bykova, V.D. Golyshv, M.A. Gonik, V.B. Tsvetovskiy, I.V. Frjazinov, M.P. Marchenko, G. de Vahl Davis, E. Leonardi, V. Timchenko, V.N. Vlasov, J.A. Serebrjakov*
- 181 Numerical - experimental investigation of crystal growth rate dependence on facet undercooling for dielectric crystal growth from the melt  
*S.V. Bykova, V.D. Golyshv, M.A. Gonik, V.B. Tsvetovskiy, V.I. Deshko, A.Ya. Karvatskii, A.V. Lenkin*
- 226 Mathematical model of heat-mass transfer during crystal growth process including cluster model of a melt constitution  
*Vladimir Ginkin, Olga Naumenko, Michael Zabudko, Andrey Kartavykh, Michael Milvidsky*
- 240 Numerical investigation of the influence of wall temperature modulation on instability in a Bridgman configuration  
*E. Semma, M. El Ganaoui, V. Timchenko, E. Leonardi*

**Two-phase flow and heat transfer (Stjerne)**

- 113 A numerical model for 3d transient evaporation processes based on the volume-of-fluid method  
*Matthias Hase, Bernhard Weigand*
- 122 Finite element moving mesh analysis of phase change problems with natural convection  
*R. T. Tenchev, J. A. MacKenzie, T. J. Scanlon, M.T. Stickland*
- 194 Calculation of dropwise condensation heat transfer using a simulation method of falling drops on a condensation surface  
*Masaaki Izumi, Satoshi Kumagai, Ryohachi Shimada, Ryou Kobayashi, Norio Yamakawa*
- 196 Numerical simulation of glass fogging and defogging  
*Giulio Croce, Paola D'Agaro, Francesca Della Mora*
- 250 A new method for including interfacial tension and wetting dynamics in the simulation of two-phase flow  
*Hansmartin Friess, Djamel Lakehal*

**12.30-1 pm: Closing session**

1-2 pm: Lunch

2.30 pm: Arrive Bergen