

**Seventh International Conference on Flow Processes in Composite Materials
July 7th (Morning Sessions)**

8:00 Welcome: Eric Kaler, Dean, College of Engineering
8:10 Keynote Address

Session 1 9:15 to 10:45 (July 7th 2004)

Thermoplastic Reactive Processing- I:

Co-Chairs: V. Michaud and C. Binetruy

Thermoplastic Composites - Products, Processes and Applications

Invited Speaker: Michael P. KNOX,
Saint-Gobain Vetrotex America, Inc

24. Thermoplastic Liquid Composite Molding: Production And Characterization Of Composites Based On Cyclic Oligomers

Hilde Parton and Ignaas Verpoest ,
Universiteit Leuven, Belgium

34. Liquid Molding of Anionic Polyamide-6 Glass Fiber Composites

Kjelt van Rijswijk ,
Delft University, Netherlands

40. Stamp-forming of reactive-thermoplastic carbon fibre/PA12 composite sheet

M.D. Wakeman, M. Kohler, J.-A. E. Manson, P. Blanchard,
E. Kleven , (EPFL), Lausanne, Switzerland and Ford Motor
Company, Dearborn, MI 48121, USA

Session 9 9:15 to 10:45 (July 7th 2004)

Short Fiber Composites:

Chair: Doug Smith and Roger Jones

53. AFM Investigation Of Microscopic Flow Of Matrix Leading To Interphase Formation In Short Melamine Fiber Reinforced Rubber Composites
R.S. Rajeev, U. of South Carolina and
S. Bandodhpay University of Sydney, AUSTRALIA

73. Fibre Dynamics Of Concentrated Suspensions Of Short Fibre Filled Polymers

Ausias

15. A Fitted Closure of the Sixth-Order Orientation Tensor for Short-Fiber Reinforced Polymer Composite Modeling

David A. Jack & Douglas E. Smith
University of Missouri – Columbia, USA

18. Characterisation of random long fibre composites and prediction of the local stiffness properties

Ericka Jao Jules, Stepan Lomov, Ignaas Verpoest
Katholieke Universiteit Leuven, Belgium

77. Injection Molding Long Glass Composites

Roger Jones
Franklin International LLC

Coffee Break (10:45 to 11 am)

Session 2 11:00 am to 12:30 pm (July 7th 2004)

Thermoplastic Reactive Processing- II:

Chair: V. Michaud

45. Perspectives for reactive moulding of PPA as matrix for high-performance composite materials

Niccolo Pini
ETH Zurich / Centre of Structure Technologies, Switzerland

19. Simulation and Control of the LCM-process with Future Matrix Systems

Florian Weyrauch
Institut für Verbundwerkstoffe, Kaiserslautern, Germany

60. Resin Film Infusion Processing of Cyclic PBT Composites: A Fundamental Study

Síora Coll
National University of Ireland, Galway,

65. Resin Transfer Molding Of Anionically Polymerised Polyamide 12

V. Michaud, J. Verrey , L. Zingraff and J.-A.E. Manson
Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Session 12 11:00 am to 12:30 pm (July 7th 2004)

Modeling and Simulation: Numerical Methods

Chair: Francois Trochu

63. New Approaches to Accelerate Calculations and Improve Accuracy of Numerical Simulations in Liquid Composite Molding

Trochu, François
Ecole Polytechnique, Montreal, Canada

27. Some numerical schemes for the numerical treatment of the advection equation in liquid composites moulding processes

J.A. García, Universidad Politécnica de Valencia, SPAIN

70. Numerical Method to Predict Void Formation Inside Fiber Tows during the LCM process

Zuzana Dimitrovová and Suresh G. Advani
IDMEC / IST and DEM , Portugal and UD, USA

57. Simulation of Isothermal RTM Using Smoothed Particle Hydrodynamics

S. Comas-Cardona, Christophe Binetruy
Ecole des Mines de Douai, France

Lunch (12:30 to 1:30 pm)

**Seventh International Conference on Flow Processes in Composite Materials
July 7th (Afternoon Sessions)**

**Session 13 1:30 pm to 3:00 pm (July 7th 2004)
Modeling and Simulation II: Process Design and Optimization
Co-Chairs: John Coulter and Scott Holmes**

8. Evolutionary Algorithms based Optimization of Filling Process in LCM

Boris Meier
ETH Zurich / Centre of Structure Technologies, Switzerland

38. Optimisation of Mould Filling Parameters for the Injection/Compression Moulding Process

M. J. Buntain, S. Bickerton
Centre for Advanced Composite Materials, The University of Auckland, New Zealand

44. Effect of Process Issues on Material Properties in RTM

Murat Sozer
Koc University, Istanbul, Turkey

41. Process simulation of LPM (Liquid Polymer Moulding) in special consideration of fluid velocity and viscosity characteristics

Matthias Repsch
IVW GmbH, GERMANY

90. Knowledge-Based Flow Process of Injection Molding

Yeun Sul Kim¹, Hyung Su Lee¹, Hi Koan Lee¹, Gyun Eui Yang¹, Hong Gun Kim²
Chonbuk National University, Jeonju, 561-756, Korea.

Coffee Break (3:00 to 3:15 pm)

**Session 14 3:15 pm to 4:45 pm (July 7th 2004)
Modeling and Simulation III: Flow and Cure
Co-Chairs: Al Loos and John Summerscales**

72. A Numerical Study of Online Cure Kinetics Characterization During Liquid Composite Molding (LCM)

Kuang-Ting Hsiao
University of South Alabama

64. FEM simulation and Monitoring of resin flow in Liquid Molding processes

V. Antonucci¹, A. Calabrò, F. De Nicola², M. Giordano¹, L. Nicolais¹, C. Vitiello
CNR-Institute for Composite and Biomedical Materials, Italy

68 Simulation of the Vacuum Assisted Resin Transfer Molding Process

X. Song and A. C. Loos
Virginia Tech Blacksburg, VA

84. Some studies on modeling the unsaturated flow in woven, stitched or braided fiber mats in LCM

Krishna M. Pillai
University of Wisconsin, Milwaukee

37. Modeling and Simulation of Liquid Composite Molding Using LIMS

M. Delegise, Christophe Binetruy
Ecole des Mines de Douai France

5:00 to 6:00 pm

Tour of Center for Composite Materials

6 pm: Dinner and Show at Three Little Bakers (Optional)

**Seventh International Conference on Flow Processes in Composite Materials
Second Day (July 8th, 2004) Morning Sessions**

**8:00 Keynote Address: W. James Renton , Director, Phantom Works, The Boeing Company
Can Composites Dominate The Commercial Aerospace Sector?**

Chair: John W. Gillespie

<p>Session 16 9:00 to 10:30 (July 8th 2004) Resin Transfer Molding: Co-Chairs: K.T. Hsiao and O Bradaigh</p>	<p>Session 8 9:00 to 10:30 (July 8th 2004) NanoComposites I: Co-Chairs: M. Santare and J. H.Lee</p>
<p>91. Carbon Fiber Reinforced Composites and the Automotive Industry: A New Frontier David Steenkamer Ford Motor Company</p>	<p>50. Influence of nanoscale morphology on the micro- and macro- mechanical behaviour of composites Invited Speaker: Volker Altstädt Universität Bayreuth • GERMANY</p>
<p>46. Evaluation of the Vibration Assisted RTM technique in the production of real parts Nikos Pantelelis Synthesites SA</p>	<p>7. Effects of Nanoclays and Carbon-Nanotubes on the Flow of Epoxy for Resin Transfer Molding Ayca Ertekin, Dr. Byron Pipes, Dr. Lloyd Goettler The University of Akron, USA</p>
<p>49. Automated RTM of Multi-Component Resin Systems - Promise and Problems Peter Joyce U.S. Naval Academy</p>	<p>14. Nanoscale Resin Flow and Permeability of Preformed Single-Walled Nanotube (SWNT) Networks Chuck Zhang, FAMU-FSU, USA</p>
<p>6. Low Cost Tooling Concepts for RTM Development Anita A. Chute, Neal A. Froeschner, V. Blake Slaughter The Boeing Company</p>	<p>43. Study On Manufacturing And Mechanical Properties Of Nanocomposite Laminates Ming-Hwa R.Jen Yu-Chung Tseng Chun-Hsien Wu National Sun Yat-Sen University Kaohsiung, Taiwan</p>
<p>76. Development of a Polyamide Copolymer Resin Transfer Moulding System for Thermoplastic Composites Mark Greaney, Conchúr M. Ó Brádaigh National University of Ireland, Galway, Ireland</p>	
<p>Coffee Break(10:30 to 10:45 am)</p>	
<p>Session 10: 10:45 to 12:15 pm (July 8th 2004) Process Control: Co-Chairs: Ranga Pitchumani and Isaac Daniel</p>	<p>Session 11 10:45 to 12:15 pm (July 8th 2004) Post-Process Properties And Characterization: Co-Chairs: Byron Pipes and Travis Biggoti</p>
<p>3. Theoretical and Experimental Evaluation of a Segmented Injection Line for Flow Control In VARTM Ajit Nalla, James Glancey, Benoit Lelievre University of Delaware, USA</p>	<p>2. Time Reversal Acoustic Structural Health Monitoring Using an Array of Embedded Sensors A.Sutin, P.Johnson, J.TenCate, A.Sarvazyan, G. Park, H.Sohn , Artann Laboratories, NJ and Los Alamos National Laboratory, NM, USA</p>
<p>9. Optical fibre sensor for monitoring flow and resin curing in composites manufacturing C. Lekakou*, S.Cook*, Y.Deng*, T.W.Ang** and G.T.Reed** University of Surrey, Guildford, Surrey UK</p>	<p>17. Analysis of Thermal Residual Stresses during the Cure of Composite Parts Manufactured by Resin Transfer Molding Edu Ruiz, François Trochu Ecole Polytechnique,Canada</p>
<p>30. On-Line / Off-Line Control of Mold Filling in Liquid Composites Molding Jeffrey M. Lawrence, Suresh G. Advani University of Delaware, USA</p>	<p>21. Evaluation of Thermoelastic Properties and Residual Thermal Stresses of Composites with Fiber Waviness G. Karami and M. Garnich,North Dakota State University and University of Wyoming, USA</p>
<p>47. Variability in liquid composite moulding techniques: process analysis and control Nuno Correia University of Nottingham UK</p>	<p>35. Characterization of Defects in Low-Cost Resin-Infused Aeronautical Structures Laura Petrescue, National Research Council Canada University of Ottawa Research Council Officer, Canada</p>
<p>54. Active Flow Control In A Vartm Process Using Localized Induction Heating Richard Johnson and Ranga Pitchumani* University of Connecticut, USA</p>	

Lunch Break(12:15 to 1:15 pm)	
Seventh International Conference on Flow Processes in Composite Materials Second Day (July 8th, 2004) Afternoon Sessions	
Session 15 1:15 pm to 2:45 pm (July 8th 2004) Vacuum Infusion Processes: Co-Chairs: Dirk Heider and Shawn Walsh	
5. Benchmark Comparison of Vacuum Infusion Resins for Aerospace Applications Andrew Loff, Jennifer Chase Fielding, Juan Borges National Composite Center, Air Force Research Lab, USA	
48. Vacuum Pump Volumetric Flow and the Vacuum Infusion Process Patrick E. Mack, CCT Verdant Technologies, Inc.	
51. Separating Bubbles by Superficial Capillary Flow in Vacuum Infusion Process W M Banks University of Strathclyde, Glasgow	
56. Validation of VARTM Flow Model By infrared (IR) Thermography Roger W. Engelbart, Dr. Michael P. Renieri, Lawrence E. Pado, and Michael L. Vandernoot Dr. Suresh Advani and Pavel Simacek The Boeing Company and University of Delaware	
80. In-Mold Coating of Composites Manufactured by the Resin Infusion between Double Flexible Tooling Process by Means of Co-Infusion P. Chiu, O.I. Okoli, H-P Wang (Corresponding: Dr. Okenwa Okoli) Florida Advanced Center for Composite Technologies	
Coffee Break (2:45 pm to 3 pm)	
Poster Session (3 pm to 4:30 pm)	
4:45 pm Buses Depart for Banquet at Longwood Gardens 9:00 pm Buses Depart from Longwood to return to University of Delaware	

**Seventh International Conference on Flow Processes in Composite Materials
Final Day (July 9th, 2004) Morning Sessions**

8:00 Panel on Role of Flow and Processing in Certification of Composite Materials

Session 4 9:00 to 10:30 (July 9th 2004)
PREFORM MODELING AND EFFECTS I-
Micromodeling of Fabric Permeability
Co-Chairs: A C Long and P. Simacek

Session 3 9:00 to 10:30 (July 9th 2004)
Thermoplastic Processing:
Co-Chairs: C Binetruy and P. Mallon

11. Computer Modeling For The Prediction Of The In-Plane Permeability Of Non-Crimp Stitch Bonded Fabrics
C.Lekakou, S.Edwards, G.Bell and S.C.Amico
University of Surrey, Guildford, Surrey, UK

92. New Tooling Concept for Large Volume Production of Parts Made of Continuous Fiber Thermoplastic Composites
Johanne Denault, G. Lebrun and P. Gagnon
Industrial Materials Institute, National Research Council Canada

52. A Permeability Prediction for (Un)Sheared Non-Crimp Fabrics
R. Loendersloot
University of Twente, Netherlands

78. Intraply Shear Characterisation of a Fibre Reinforced Thermoplastic Composite
Dr. Walter Stanley
University of Limerick, Ireland

61. Permeability Network Model Of Non-Crimp Fabrics
Staffan Lundstrom
Lulea University of Technology, Sweden

31. In-mold Coating of Thermoplastic Parts-Process Modeling and Simulation
Jose M Castro
The Ohio State University

36. Interpretation of permeability in a unidirectional non-crimp stitched preform by geometrical description of the porosity
Laurent Bizet
LMPG Université du Havre – France

58. Liquid Molding of Carbon Fabric Reinforced Nylon Matrix Composite Laminates
Selvum Pillay, Haibin Ning, Uday K. Vaidya and Gregg M. Janowski
University of Alabama at Birmingham

Coffee Break(10:30 to 10:45 am)

Session 5 10:45 to 12:15 pm (July 9th 2004)
PREFORM MODELING AND EFFECTS II- Global Effects of Permeability:
Co-Chairs: R. Parnas and Lundstrom

Session 17 10:45 to 12:15 pm (July 8th 2004)
Nanocomposites II:
Co-Chairs: C. Zhang and B. Pipes

62. Development Of Permeability Models For Saturated Fluid Flow Across Arrays Of Fiber Clusters
T.D. Papathanasiou
University of South Carolina

22. Polymer Nanocomposites for Solid State Electrolytes
Gwomei Wu
Chang Gung University, Taiwan

12. Prediction of the effects of fibre architecture on permeability using the stream-surface method
C. C. Wong, F. Robitaille, A. C Long, C. D Rudd
University of Nottingham U.K.

75. Smart Nanocrystalline Polymeric Thin Films
Prafull Mathur
National Physical Laboratory(NPL-CSIR), New Delhi, India

16. The significance of the time-dependent behavior of fibrous materials in resin infusion processes
Dr. Piaras A. Kelly
Dept. Engineering Science, University of Auckland, New Zealand

82. Vapor grown carbon fiber reinforced polycarbonate composites
Young Kuk CHOI
Shinshu University (Japan)

13. Robust Design of RTM Process with Statistical Characterization of Permeability and Flow Simulation
Chuck Zhang
FAMU-FSU College of Engineering, USA

93. The Preparation of Clay-Glass Fiber-Epoxy Hybrid Nanocomposites using VARTM
Lee, Joong Hee¹, Suresh G. Advani², and Lin, Liyu¹
Chonbuk National University, Chonju, Korea and UD, USA

20. Mold filling simulations for RTM: Influence of the scatter of preform permeability
Frederik Desplentere
Katholieke Universiteit Leuven, Belgium

95. Manufacturing and Performance of Carbon-Nanotube Composites
Santare, Johnson and Novotny
University of Delaware, USA

Lunch Break(12:15 to 1:15 pm)

<p>Seventh International Conference on Flow Processes in Composite Materials Third Day (July 8th, 2004) Afternoon Sessions</p>
<p>Session 6 1:15 pm to 2:45 pm (July 8th 2004) PREFORM MODELING AND EFFECTS III - Compressibility Co-Chairs: Simon Bickerton and T. Papathasiou</p>
<p>1. Investigating Non-elastic Effects during Compression of Fibre Reinforcements A. A. Somashekar, S. Bickerton, and D. Bhattacharyya Centre for Advanced Composite Materials, The University of Auckland, New Zealand</p>
<p>4. Influences of the Sewing Process on the Compaction Behaviour of Fibrous Preforms Amol Ogale, Hubert Stadtfeld Institut für Verbundwerkstoffe, Kaiserslautern, Germany</p>
<p>79. Compaction of Dry and Lubricated Fibre Reinforcements Rowan Paton Teresa Kruckenberg Paul Falzon Cooperative Research Centre for Advanced Composite Structures. Australia</p>
<p>66. Non Saturated Flow In Compressible Preforms V. Michaud¹, J. Wolfrath, A. Modaressi and J.-A.E. Månson Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland</p>
<p>Coffee Break (2:45 pm to 3 pm)</p>
<p>Session 7 3:00 pm to 4:30 pm (July 9th 2004) PREFORM MODELING AND EFFECTS VI – Permeability Measurements Co-Chairs: R. Parnas and A. Sastry</p>
<p>23. Permeability Measurements of Preform-packages Henna Talvensaari Polymer Competence Center Leoben (PCCL), Austria</p>
<p>25. Permeability Work Cell for Fibrous Reinforcements Hubert C. Stadtfeld Institut für Verbundwerkstoffe, Kaiserslautern, Germany</p>
<p>55. High Throughput Permeability Measurement Richard Parnas and Qiang Liu, UCONN Kris Hoes, VUB Raymond Boeman and Rick Battiste, ORNL, USA</p>
<p>74. The effect of permeant on the measured permeability of reinforcement John Summerscales University of Plymouth, UK</p>
<p>89. Permeability measurements-In plane and through the thickness Maarten Laborus Centre of Lightweight Structures TUD-TNO, Netherlands</p>
<p>4:45 pm to 8 pm Golf Outing (Optional)</p>