

Jundika Candra KURNIA

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Educational Background

Ph.D. (Research Scholar). Division of Energy and Bio-Thermal System, Department of Mechanical Engineering, National University of Singapore, 2007-2011 (Thesis has been submitted, waiting for oral defense).

Research Project: Computational Study of Transport Phenomena and Deformation Behavior of Stimuli Sensitive Hydrogels

Supervisor: Prof. Arun S. Mujumdar, Co-advisor: Asst. Prof. Erik Birgersson.

B.Eng. (Hons) (Cum Laude). Engineering Physics Department, Gadjah Mada University, Indonesia, 2003-2006.

Thesis title: Study on the effect of convergent-divergent nozzle on the Hero turbine performance

Thesis supervisor: Kutut Suryopratomo B.Eng, M. Sc. and Dr.-Ing. Sihana

Research Interest

- Solid mechanics, smart materials
- Industrial transport processes, heat and mass transfer, drying technology, thermal analysis
- Application of Computational Fluid Dynamics (CFD) on industrial processes
- New and renewable energy

Teaching Interest

- Heat and mass transfer
- Solid mechanics
- Engineering mathematics
- Computer programming and computational simulation
- Thermodynamics
- Engineering drawing

Teaching Experience :

1. Teaching assistant on Engineering Physics Department, Gadjah Mada University in subject:
 - Thermal Analysis, semester 1 academic year 2006/2007
 - Automatic Control, semester 1 academic year 2006/2007
 - Computer Programming Lab., semester 1 academic year 2005/2006
 - System Dynamics, semester 2 academic year 2005/2006
 - Engineering Drawing Lab., semester 2 academic year 2005/2006
 - Electronics, semester 1 academic year 2005/2006
 - Computer Programming Lab., semester 1 academic year 2005/2006
 - Thermodynamics, semester 2 academic year 2004/2005
 - Engineering Drawing Lab., semester 2 academic year 2004/2005
 - Statistic Lab., semester 1 academic year 2004/2005
2. Teaching assistant on Department of Mechanical Engineering, National University of Singapore in subject:
 - Performance evaluation of air conditioners Lab., semester 1 academic year 2009/2010
 - Performance evaluation of air conditioners Lab., semester 1 academic year 2010/2011
3. Teaching assistant on Bachelor Technology Program, National University of Singapore in subject:
 - Engineering Mathematics (Matlab Lab.), semester 2 academic year 2009/2010

Professional Membership:

1. Student membership of Material Research Society
2. Transport Process Research (TPR) group member

Publications :

E-Book:

1. A.P. Sasmito, **J.C. Kurnia**, S.V. Jangam, 2011, Mathematical Modeling of Transport Processes, TPR Group, Singapore, ISBN: 978-981-08-9179-4 (available online at: <http://serve.me.nus.edu.sg/arun>).

E-Book Chapter :

1. **J.C. Kurnia**, A.P. Sasmito, T. Wei, A.S. Mujumdar, 2011, Conjugate Model for Drying of Thin Slabs Using Impinging Jets, in: Drying of Foods, Vegetables and Fruits - Volume 3, edited by S.V. Jangam, C.L. Law and A.S. Mujumdar, TPR Group, Singapore, ISBN: 978-981-08-9426-9. (available online at: <http://serve.me.nus.edu.sg/arun>).
2. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2011, Heat Transfer in Square duct, in: Selected Topics in Heat and Mass Transport, TPR group, Singapore (available online at <http://serve.me.nus.edu.sg/arun>).
3. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2011, Heat Transfer in Square duct, in: Selected Topics in Heat and Mass Transport, TPR group, Singapore (available online at <http://serve.me.nus.edu.sg/arun>).
4. **J. C. Kurnia**, E. Birgersson, and A. S. Mujumdar, 2009, Heat and mass transfer in gels, in Mathematical Modeling of Industrial Transfer Process, edited by Xu Peng, Wu Zhonghua, A. S. Mujumdar., pp. 57-68, TPR Group, Singapore. ISBN: 978-981-08-6269-5 (available online at: <http://serve.me.nus.edu.sg/arun>).

Journals :

1. J. C. Kurnia, E. Birgersson, and A. S. Mujumdar, 2011, Analysis of a model for pH-sensitive hydrogels, Polymer. {manuscript submitted under review}

2. J. C. Kurnia, E. Birgersson, and A. S. 2011, Mujumdar, *Finite deformation of fast-response thermo-sensitive hydrogels - A computational study*, Journal of the Mechanics and Physics of Solids. {revision submitted under review}
3. J. C. Kurnia, E. Birgersson, and A. S. Mujumdar, 2011, *A Phenomenological Model for Hydrogels with Rigid Skin Formation*, International Journal of Applied Mechanics. {Accepted for publication}.
4. J. C. Kurnia, E. Birgersson, and A. S. Mujumdar, 2011, A Mathematical Model for pH-sensitive Hydrogels for Autonomous Microfluidic Flow Control, Journal of Functional Biomaterials. Vol 2 (3), pp. 195-212.
5. J. C. Kurnia, E. Birgersson, A. S. Mujumdar, Tay Sock Peng, Yew Yong Kin and Hua Li, 2011, *A phenomenological model for coupled alcohol and temperature sensitive hydrogels*, International Journal of Applied Mechanics. Vol 3 (2), pp. 279-298.
6. J. C. Kurnia, E. Birgersson, A. S. Mujumdar and L.C. Quah, 2009, *Mathematical Modeling of Hydrogels for Microfluidic Flow Control*, Advanced Material Research, Vol. 74 pp 33-36.
7. J.C. Kurnia, A.P. Sasmito, S.V. Jangam, A.S. Mujumdar, 2011, *Improved Design for Heat Transfer Performance of a Novel Phase Change Material (PCM) Thermal Energy Storage (TES)*, Applied Thermal Engineering. {manuscript submitted under review}
8. M. Shaker, H. Ghaedamini, A.P. Sasmito, J.C. Kurnia, S.V. Jangam, A.S. Mujumdar, 2011, *Numerical Investigation of Laminar Mass Transport Enhancement in Gaseous Microreactors*, Chemical Engineering Processing: Process Intensification, 2011. {manuscript submitted under review}
9. J. C. Kurnia, A. P. Sasmito, S. V. Jangam, A. S. Mujumdar, 2011, *Heat Transfer in Coiled Square Tubes for laminar flow of a slurry of Microencapsulated Phase Change Material (MEPCM)*, Heat Transfer Engineering special Issue IMPRES 2010. {manuscript submitted}
10. A. P. Sasmito, J. C. Kurnia, A. S. Mujumdar, 2011, *Numerical evaluation of transport phenomena in a T-junction micro-reactor with coils of different configurations*. Industrial Engineering Chemical Research {in press DOI:10.1021/ie200139s }
11. J. C. Kurnia, A. P. Sasmito, A. S. Mujumdar, *Laminar convective heat transfer for in-plane spiral coils of non-circular cross sections ducts: A computational fluid dynamics*

study, Thermal Science {in press DOI: 10.2298/TSCI100627014K }

12. A. P. Sasmito, J. C. Kurnia, A. S. Mujumdar, 2011, *Numerical evaluation of laminar heat transfer enhancement in nanofluid flow in coiled square tubes*. *Nanoscale Research Letters* Vol. 6, pp. 376.
13. J. C. Kurnia, A. P. Sasmito, A. S. Mujumdar, 2011, *Numerical investigation of laminar heat transfer performance of various cooling channel designs*, *Applied Thermal Engineering* Vol. 31, pp 1293-1304.
14. J. C. Kurnia, A. P. Sasmito, A. S. Mujumdar, 2011, *Evaluation of heat transfer performance of helical coils of non-circular tubes*, *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, Vol. 12 (1), pp 63-70.
15. P. Xu, Z.H. Wu, S.M.A. Rahman, A.P. Sasmito, J.C. Kurnia, P.H. Joo and K.E. Birgersson, Report on Honorary Doctorate for Editor-in-Chief Professor Arun S. Mujumdar Receives Doctor Honoris Causa Award from Lodz Technical University, Poland on June 11, 2008, *Drying Technology*, Vol 26, pp. 1618-1622.

Conferences :

1. **A.P. Sasmito**, J.C. Kurnia, E. Birgersson, A.S. Mujumdar, 2011, Numerical Evaluation of Performance of Oblique-Fin Channel for PEM Fuel Cell Stacks Relatives to Conventional Channels, 3rd International Conference on Fuel Cell and Hydrogen Technology, Kuala Lumpur, Malaysia, 2011, accepted.
2. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2011, *Study Improved Design for Heat Transfer Performance of a Novel Phase Change Material (PCM) Thermal Energy Storage (TES)*, 4th Sriwijaya International Seminar on Energy Science and Technology (SISEST) 2011, 5-6 October 2011.
3. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2011, *Impingement Drying*, One Day Course on Industrial Drying Technologies: Principles and Practice. 1 October 2011, Singapore.
4. **J. C. Kurnia**, A. P. Sasmito, S. V. Jangam, A. S. Mujumdar, 2011, *Model for Drying of Thin Slabs Using Pulsed Turbulent Impinging Jets*, 7th Asia-Pacific Drying Conference (ADC) 2011, Tianjin, China, 18-20 September 2011.

5. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2010, *Evaluation of heat transfer performance of helical coils of non-circular tubes*, International Symposium on Innovative Materials for Processes in Energy System (IMPRES) 2010.
6. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2010, *Convective heat transfer in coils of non-circular cross-sections: CFD study of laminar heat transfer enhancement relative to straight pipes*, 3rd Sriwijaya International Seminar on Energy Science and Technology (SISEST) 2010.
7. **J. C. Kurnia**, A. P. Sasmito, A. S. Mujumdar, 2010, *Computational Study of Energy-Efficient Thermal Drying Using Intermittent Impinging Jets*, 8th ASEAN ANSYS Conference 2010 Singapore.
8. **J. C. Kurnia**, E. Birgersson, and A. S. Mujumdar, 2010, *Analysis of Polyelectrolyte Temperature Sensitive Hydrogels*, Regional Conference on Mechanical and Aerospace Technology 2010 Bali, Indonesia.
9. **J. C. Kurnia**, E. Birgersson, and A. S. Mujumdar, 2009, *Study of Thermo-Sensitive Hydrogels for Microfluidic Flow Control*. 216th ECS meeting 2009 Vienna, Austria.
10. **J. C. Kurnia**, E. Birgersson, and A. S. Mujumdar, 2009, *A Reduced Model for pH-Sensitive Hydrogels*, International Conference on Material for Advanced Technologies (ICMAT) 2009 Singapore.
11. **J. C. Kurnia**, E. Birgersson, A. S. Mujumdar and L.C. Quah, 2009, *Mathematical Modeling of Hydrogels for Microfluidic Flow Control*, International Conference on Material for Advanced Technologies (ICMAT) 2009 Singapore.
12. **J. C. Kurnia**, E. Birgersson, A. S. Mujumdar, *Heat and mass transfer in gels*, Workshop on Mathematical Modeling in Minerals, Metals and Materials Processing, 14 March 2009, Singapore.

Research Experiences :

1. Computational study of transport phenomena and deformation behavior of stimuli sensitive hydrogels:
 - Fundamental research (various stimuli-sensitive hydrogels)
 - Applied research (Application of hydrogel as microfluidic flow controller)
2. Mathematical modeling of drying:

- Conjugate model for drying of porous media.
 - Effect of pulsation and intermittent inlet on drying of heat sensitive materials.
3. Impinging jet heat and mass transfer:
 - Mathematical modeling of jet impingement for improved heat and mass transfer in drying.
 - Effect of pulsating and intermittent flow in impinging jet heat transfer: laminar and turbulent.
 4. Heat transfer performance in non-circular tubes:
 - Heat transfer in straight, coiled and helical duct in various shape and size: laminar, turbulent, various Re and Pr number, newtonian, non-newtonian fluid and nano-fluid for compact heat exchanger.
 - Application of coiled design in cooling system of electronic, fuel-cell and battery stack
 5. Design of thermal energy storage:
 - Experimental design and mathematical modeling of thermal energy storage
 - Investigate various design of thermal energy storage, particularly with phase change material

Thesis Supervision :

1. Hua Cheng, Phenomenological modeling of stimuli sensitive hydrogels. Department of Chemical and Biomolecular Engineering, National Univesity of Singapore, 2010/2011
2. Ang Ming Li, A study of temperature-sensitive hydrogels, *Undergraduate Thesis*, Department of Chemical and Biomolecular Engineering, National Univesity of Singapore, 2010/2011
3. Zhang Jun Huang, Evaluation of Heat Transfer Performance of Helical Coils of Noncircular Tubes *Undergraduate Thesis*, Department of Mechanical Engineering, National Univesity of Singapore, 2010/2011
4. Ong Zhao Fu Amos, Design of Novel Heat Exchangers for Solar Thermal Energy Storage in a Phase Change Material, *Undergraduate Thesis*, Department of Mechanical Engineering, National Univesity of Singapore, 2010/2011

5. Tay Sock Peng, A study of alcohol-sensitive hydrogels, *Undergraduate Thesis*, Department of Chemical and Biomolecular Engineering, National University of Singapore, 2009/2010
6. Varjeet Kaur, Transport phenomena and deformation behavior of hydrogels, *Undergraduate Thesis*, Department of Mechanical Engineering, National University of Singapore, 2009/2010
7. Ng Hong Keat, Transient analysis of pH-sensitive hydrogels, *Undergraduate Thesis*, Department of Chemical and Biomolecular Engineering, National University of Singapore, 2008/2009
8. Quah Lee Ching, Design and modeling of flow control with hydrogels, *Undergraduate Thesis*, Department of Chemical and Biomolecular Engineering, National University of Singapore, 2008/2009

Professional Service as Peer-Reviewer in Journals :

- International Journal of Heat and Mass Transfer (with Prof. A.S. Mujumdar)
- Applied Thermal Engineering (with Prof. A.S. Mujumdar)
- AIChE Journal (with Prof. A.S. Mujumdar)
- International Journal of Thermal Science (with Prof. A.S. Mujumdar)

Software Skills :

- Comsol Multiphysics (Expert)
- Matlab, Maple (Advanced)
- AutoCAD, Ms Visio, Scientific Word/Latex, Ms Office (Expert)
- Fluent, Gambit, C/C++ (Advanced)

References :

- **Prof. Arun S. Mujumdar:** Professor in Mechanical Engineering Department and Director of Minerals Metals and Materials Technology Centre (M3TC), Editor-in-Chief of

Drying Technology—An International Journal, National University of Singapore, email:
mpeasm@nus.edu.sg

- **Dr.-Ing. Sihana:** Head of Department of Engineering Physics, Gadjah Mada University, Indonesia, email: sihana@ugm.ac.id