CURRICULUM VITAE
Ali S. Rangwala

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BACKGROUND

Education

2006 **Ph.D.** University of California, San Diego, CA
Mechanical and Aerospace Engineering
Advisors: Prof. Steven G. Buckley, Forman A. Williams, and Kalyanasundaram Seshadri
Major Field: Combustion
Dissertation: "Flame Spread Analysis using a Variable B-Number"

2004 **M.S.** University of Maryland, College Park, MD
Department of Fire Protection Engineering
Advisor: James G. Quintiere

2000 **B.S** Government College of Engineering, Pune, India
Department of Electrical Engineering

Research Experience

7/2006 – present *Assistant Professor,* **Department of Fire Protection Engineering, Worcester Polytechnic Institute, Worcester**

Assistant Professor, **Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester** (Collaborative Appointment)

Research Interests: Fundamental studies related to dust ignition and propagation, flame spread on solid fuels, and compartment fire modeling.

01/2003 − 05/2006 **Graduate Research Assistant** – UCSD, Combustion Energy Research Laboratory

01/2000 − 01/2003 **Graduate Research Assistant** – U of Maryland, Fire Protection Engineering

SCHOLARSHIP

Papers and Publications *(Author names in boldface indicate students)*

Refereed Publications (Journal):

1. J. G. Quintiere and A. S. Rangwala, **"A Theory of Flame Extinction based on Flame Temperature,"** *Fire and Materials*, 2003.
2. Y. Utiskul, J. G. Quintiere, A. S. Rangwala, B. A. Ringwelski, K. Wakatsuki and T. Naruse, "**Compartment Fire Phenomena under Limited Ventilation,"** *Fire Safety Journal,* Volume 40, Issue 4, June 2005.

3. A. S. Rangwala, S. G. Buckley and J. L. Torero, **"Analysis of the Constant B-number Assumption while Modeling Flame Spread,"** *Comb and Flame*, Vol. 152 (3), 401 -414, 2008.
4. V. Raghavan, A. S. Rangwala, and J. L. Torero, **"Laminar Flame Propagation on a Horizontal Fuel Surface - Verification of Classical Emmons Solution,"** Comb. Theory and Modeling (in review).

Refereed Publications (Conference):

1. J. L. Consalvi, B. Porterie, M. Coutin, L. Audoin, C. Casselman, A. Rangwala, S.G. Buckley, J.L. Torero, **"Upward Propagation over PMMA: Theory, Experiment and Numerical Modeling,"** 8th International Symposium on Fire Safety Science, Beijing, China, Sep 18-23, 2005.
2. A. S. Rangwala, S. G. Buckley and J. L. Torero, **"Upward Flame Spread on Vertically-Oriented Fuel Surface: The Effect of Finite Width,"** *Proc Comb. Inst.* Vol. 31 (2), 2607-2615, 2007.
3. A. S. Rangwala, **"Flame Spread Analysis using a Variable B-Number,"** 9th International Symposium on Fire Safety Science, Sep 21- 26, 2008.

Non Refereed Publications:

Conference papers:

1. T. Naruse, A. S. Rangwala, B. A. Ringwelski, Y. Utiskul, K. Wakatsuki, and J. G. Quintiere, **"Compartment Fire Behavior Under Limited Ventilation,"** 4th International Seminar on Fire and Explosion Hazards, University of Ulster, Northern Ireland, UK, Sept 8-12, 2003.
2. M. Coutin, A. S. Rangwala, S. G. Buckley, and J. L. Torero, **"Material Properties Governing Co-Current Flame Spread in Microgravity: The Effect of Air Entrainment,"** 7th NASA microgravity combustion workshop, Cleveland, Ohio, June 3-6, 2003.
3. A. S. Rangwala, J. L. Torero, S. G. Buckley, **"Towards Determination of the B number for Co-Current Flame Spread using the Fire Dynamic Simulator (FDS) Code: Comparison Between Model and Experiment,"** Paper 03F-36, Fall Technical Meeting of the Western States Section of the Combustion Institute, University of California, Los Angeles, October 20-21, 2003. (Impact factor: Citation number: 2)
4. A. S. Rangwala, S. G. Buckley, and J. L. Torero, "**Modeling and Analysis of the Upward Burning of PMMA,**" 43rd AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-13, 2005.
5. A. S. Rangwala, S. G. Buckley, and J. L. Torero, "**A New Scaling for Upward Burning Flames in Natural Convection, with Applications to Material Flammability Assessment,**" 4th Joint Meeting of the U.S. Sections of the Combustion Institute, Philadelphia, PA, March 20-23, 2005.
6. A. S. Rangwala, S. G. Buckley, and J. L. Torero, **"An Analysis of Upward Burning Utilizing Experimentally Measured Stand-off Distances,"** Paper 05F-16, Fall Technical Meeting of the Western States Section of the Combustion Institute, Stanford University, Stanford, October 17-18, 2005.
7. A. S. Rangwala, T. J. Myers, and A. F. Ibarreta, **"Measurement of the Non-Dimensional Frank-Kamenetskii Number Using a Standard Dust Layer Ignition Testing Apparatus,"** 5th International Conference on Fire and Explosion Hazards, Edinburgh, Scotland, April 23-27, 2007
8. A. S. Rangwala, S. G. Buckley, N. A. Dembsey, and J. L. Torero, **"Modeling Solid-Phase Pyrolysis using Emmons Burning Rate Solution, Application to FDS,"** 5th International Conference on Fire and Explosion Hazards, Edinburgh, Scotland, April 23-27, 2007.
9. **T. M. Hetrick** and A. S. Rangwala, **"Validation Study on Clean Extinguishing Agent Hold Time Calculation Methodologies,"** Suppression and Detection Research and Applications (SUPDET), Mar 11-13, 2008, Orlando, Florida.
10. **T. M. Hetrick** and A. S. Rangwala, **"Analysis of Clean Extinguishing Agent Hold Time Calculation Methodologies,"** Spring, Technical Meeting of the Central States Section of the Combustion Institute, University of Alabama, April 20-22, 2008.

11. **S. R. Rockwell** and A. S. Rangwala, **"Frequency and Spatial Dependence of Cross Correlation Velocimetry,"** Spring, Technical Meeting of the Central States Section of the Combustion Institute, University of Alabama, April 20-22, 2008.
12. **H. Park,** A. S. Rangwala, N. A. Dembsey, and E. J. Granite, "**Estimation of Thermal and Kinetic Parameters to Model Coal Dust Ignition,"** Pittsburgh Coal Conference, University of Pittsburgh (abstract under review)
13. A. S. Rangwala, V. Raghavan, and E. J. Granite, **"Using Thermal and Kinetic Parameters to Model Coal Dust Ignition in a Corner Configuration"** Pittsburgh Coal Conference, University of Pittsburgh (abstract under review)

Conference Presentations w/o papers:

1. A.S. Rangwala, S. G. Buckley, J. L. Torero, **"Understanding Material Property Impacts on Co-Current Flame Spread: Improving Understanding Crucial for Fire Safety,"** Workshop on Strategic Research to Enable NASA's Exploration Missions; Cleveland, OH June 22-23, 2004
2. H. Kytomaa, F. Gavelli and A. Rangwala, **"Steps Involved in the Analysis of Spill Scenarios,"** *AICHE, Vancouver, Sep 11 -13, 2005.*
3. **J. P. Crocker,** J. P. Woycheese, A. S. Rangwala, and D. J. Le Blanc, **"Effect of lintel depth, fire size, and sprinkler activation on ceiling jet velocity and temperature in a doorway,"** *SFPE Annual Professional Development Conference and Expo*, Las Vegas, NV (2007).
4. **S. R. Rockwell** and A. S. Rangwala, **"Frequency and Spatial Dependence of Cross Correlation Velocimetry,"** *SFPE Annual Professional Development Conference and Expo*, Charlotte, NC, Oct 12 -17 (2008).
5. **Jason W. Brown, Freddy X. Jervis, Scott R. Rockwell**, Ali S. Rangwala, and Nick A. Dembsey, "**Characterizing Material Flammability using a Critical B-number,"** *SFPE Annual Professional Development Conference and Expo*, Charlotte, NC, Oct 12 -17 (2008).

Professional Presentations (Invited Talks)

1. "**Mathematical Modeling of Low Ventilation Compartment Fires, using Mathematica as an Equation Solver,**" National Institute of Standards and Technology, (NIST), Gaithersburg, MD, Aug 2002.
2. **"A Variable B-Number for Modeling Laminar Flame Propagation"**, National Institute of Standards and Technology, (NIST), Gaithersburg, MD, Nov 2006.

Honors and Awards

2008, International Association for Fire Safety Science (IAFSS) Thesis Award

TEACHING

Courses

Spring 2008, 2007 WPI FP 673 /Industrial Fire Protection

The objectives of this course are to provide a scenario-based engineering framework for evaluating industrial fire hazards and determining appropriate fire protection measures, and to apply these engineering principles to generic industrial fire protection issues such as plant layout, warehouse storage, and flammable liquid hazards.

Fall 2007 WPI FP 575 / Explosion Protection

The objectives of this course are to understand fuel - air explosion phenomena for both deflagrations and detonations, learn how to calculate unmitigated, closed vessel, explosion pressures and time scales, analyze pressure development in vented gas and dust deflagrations, design and specify deflagration vents per NFPA and other standards, understand the conceptual design and applications of explosion suppression and isolation systems, as well as inerting approaches to explosion protection, and learn blast wave theory/correlations and their applicability to different types of explosions. Evaluate structural damage and injury potential of blast waves.

Fall 2007, 2006 WPI FP 580 ME 593 / An Introduction to Combustion
I developed "An Introduction to Combustion" (Graduate Level) course which was offered at WPI for the first time in 10 years. The course is cross listed with Mechanical Engineering and will be cross listed with Chemical Engineering by Fall 2008. The primary goal of the class is to provide students with tools and understanding to solve the basic problems in combustion and to enable them to read and understand the literature in this broad field of study. It covers fundamental governing equations for reacting flow, chemical kinetics, and mechanisms of hydrocarbon oxidation.

Graduate theses and dissertations

Haejun Park, Ph.D. student, Dust Ignition and Deflagration

We will be publishing one conference paper (Pittsburgh Coal Conference) and one journal paper (Fuel) related to this study in 2008.

Jeremiah Crocker, M.S. student, Study of Fire Induced Flows at Doorway

Jeremiah presented his initial results at the SFPE conference in Las Vegas in 2006. He is currently finishing up a paper that is going to be submitted in Fire Technology.

Todd Hetrick, M.S. student, Validation of Clean Agent Hold Time models

Todd presented his work at the Suppression Alarm and Detection Conference (SUPDET), in 2007 and 2008. Todd will present his work at the central states combustion meeting in April, 2008. We are in the process of converting this work to a journal paper this summer (2008).

Scott Rockwell, Ph.D. student, Velocity Measurement using Cross Correlation Velocimetry

Scott is presenting his work at the central states combustion meeting in April 2008.

Ph.D. thesis committee for: Bihter Padak, Department of Chemical Engineering (WPI).

M.S. thesis committee for: Melissa Barter Avila, Department of Fire Protection Engineering (WPI)

Independent Studies (Graduate)

Spring 2008 and Fall 2007 WPI FP 525 Modeling Combustion in a Furnace using Fluent

Terumi Hisano (Chem Eng) is working on this project. The project is Co-advised with Dr. Scott Davis at Exponent, Natick. A paper in the Journal of Process Safety Progress is planned to be submitted by the end of the summer.

Spring 2008 WPI FP 582 / Measurement of Laminar Burning Velocity using a Slot Burner

Halie Schiess (Civil Eng/FPE) is working on this project. She is assisting the MQP group by running a CFD simulation of the experiments.

Spring 2008 WPI FP 580 / Modeling Carbon Monoxide Concentrations in a Industrial Facility

Kathryn Hall (ME/FPE) is working on modeling the concentration of Carbon Monoxide (CO) in a residential building with and without forced ventilation. She presented her work as a poster in WPI GRAD 2008. The project is co advised by Dr. Scott Davis at Exponent, Natick, MA.

Fall 2007 WPI FP 500 / Influence of Oxygen Absorption to Ignition of Coal Dust Layers

Haejun Park (FPE) worked on this project. We have published one conference paper (Pittsburgh Coal Conference) and are in the process of completing one journal paper (Fuel) with this work

Spring 2007 WPI FP 590 / Estimation of the Critical B-Number

Jay Brown (FPE) and Freddy Jervis (ME) worked on this project in Spring 2007. The study is closely related to my PhD dissertation topic. Jay will be presenting this work at the SFPE conference, in North Carolina.

Spring 2007 WPI FP 591/ Numerical Prediction of Ignition of Dust Layer

Rahul Terdalkar (ME) worked on this project. His results were used in a conference paper (Fire and Explosion Hazards Conference, 2007, Edinburgh, UK).

Academic Advising

Advising 3 undergraduate students, 3 graduate students (full time), 6 graduate students (part time degree) and 1 graduate student (part time non degree).