

Contents

Preface	iii
International Association for Fire Safety Science	iv
In Memoriam	v
Symposium Committees	vi

1985 Howard W. Emmons Invited Lecture

Fluid Dynamic Aspects of Room Fires	
<i>E. E. Zukoski</i>	1

Fire Physics

The Needed Fire Science	
<i>H. W. Emmons</i>	33

Flame Spread over Thin Layers of Crude Oil Sludge	
<i>T. Suzuki, N. Kudo, J. Sato, H. Ohtani, and T. Hirano</i>	55

Flow Assisted Flame Spread over Thermally Thin Fuels	
<i>H. T. Loh and A. C. Fernandez-Pello</i>	65

Upward Turbulent Flame Spread	
<i>K. Saito, J. G. Quintiere, and F. A. Williams</i>	75

Thermal Modeling of Upward Wall Flame Spread	
<i>Y. Hasemi</i>	87

Effect of Sample Orientation on Piloted Ignition and Flame Spread	
<i>A. Atreya, C. Carpentier, and M. Harkleroad</i>	97

Thermal Response of Compartment Boundaries to Fire	
<i>J. R. Mehaffey and T. Z. Harmathy</i>	111

Fully Developed Compartment Fires: The Effect of Thermal Inertia of Bounding Walls on the Thermal Exposure	
<i>B. Böhm</i>	119

Full Scale Experiments for Determining the Burning Conditions to Be Applied to Toxicity Tests	
<i>T. Tanaka, I. Nakaya, and M. Yoshida</i>	129

Temperature Correlations for Forced-Ventilated Compartment Fires	
<i>K. L. Foote, P. J. Pagni, and N. J. Alvares</i>	139

A Contribution for the Investigation of Natural Fires in Large Compartments <i>E. Hagen and A. Haksever</i>	149
Some Field Model Validation Studies <i>G. Cox, S. Kumar, and N. C. Markatos</i>	159
Turbulent Buoyant Flow and Pressure Variations around an Aircraft Fuselage in a Cross Wind near the Ground <i>H. S. Kou, K. T. Yang, and J. R. Lloyd</i>	173
Conditionally-Sampled Estimates of Turbulent Scalar Flux in a Simulated Fire <i>N. L. Crauford, K. N. C. Bray, and J. B. Moss</i>	185
A Method for Calculating the Configuration Factor between a Flame and a Receiving Target for a Wide Range of Flame Geometries Relevant to Large Scale Fires <i>G. Hankinson</i>	197
Prediction of the Heat Release Rate of Wood <i>W. J. Parker</i>	207
Some Critical Discussions on Flash and Fire Points of Liquid Fuels <i>H. Ishida and A. Iwama</i>	217

Structural Behavior

Structural Fire Behaviour—Development Trends <i>O. Pettersson</i>	229
Heat Conduction in Insulated Metal Roof Decks during Fire: A Computational Approach <i>D. Brein and P. G. Seeger</i>	249
Measured and Predicted Behaviour of Steel Beams and Columns in Fire <i>Y. Anderberg, N. E. Forsén, and B. Aasen</i>	259
Structural Behaviour of Steel Frame in Building Fire <i>K. Nakamura, K. Shinoda, M. Hirota, and K. Kawagoe</i>	271
Effects of Biaxial Loading on the High Temperature Behaviour of Concrete <i>K. Kordina, C. Ehm, and U. Schneider</i>	281
Influence of Restraint on Fire Performance of Reinforced Concrete Columns <i>T. T. Lie and T. D. Lin</i>	291
Principles for Calculation of Load-Bearing and Deformation Behaviour of Composite Structural Elements under Fire Action <i>K. Rudolph, E. Richter, R. Hass and U. Quast</i>	301

Numerical Simulations of Fire Resistance Tests on Steel and Composite Structural Elements or Frames	
<i>J. B. Schleich, J. C. Dotreppe, and J. M. Franssen</i>	311
Contribution to Fire Resistance from Building Panels	
<i>B. J. Norén and B. A.-L. Östman</i>	325
Reliability-Based Design of Structural Members for Nuclear Power Plants	
<i>U. Schneider and D. Hosser</i>	337

Fire Chemistry

Some Unresolved Fire Chemistry Problems	
<i>R. Friedman</i>	349
Spatial Variation of Soot Volume Fractions in Pool Fire Diffusion Flames	
<i>S. Bard and P. J. Pagni</i>	361
The Involvement of Oxygen in the Primary Decomposition Stage of Polymer Combustion	
<i>C. F. Cullis</i>	371
Oxidative Pyrolysis of Polymers before Flaming Ignition	
<i>A. Bagnée and F. R. S. Clark</i>	381
Heat of Gasification for Pyrolysis of Charring Materials	
<i>M. Sibulkin</i>	391
A Combustibility Study of Gaseous Pyrolysates Produced by Polyester/Cotton Blends	
<i>M. Day, T. Suprunchuk, and D. M. Wiles</i>	401
TGA/APCI/MS/MS, A New Technique for the Study of Pyrolysis and Combustion Products	
<i>Y. Tsuchiya</i>	411
Halogen-Free Flame-Retardant Thermoplastic Polyurethanes	
<i>D. R. Hall, M. M. Hirschler, and C. M. Yavornitzky</i>	421
Major Species Production by Solid Fuels in a Two Layer Compartment Fire Environment	
<i>C. L. Beyler</i>	431
The Formation of Carbon Monoxide from Diffusion Flames	
<i>S. Lomax and R. F. Simmons</i>	441
Scale Effects on Fire Properties of Materials	
<i>A. Tewarson and J. S. Newman</i>	451

Critical Ignition Temperatures of Wood Sawdusts
T. Kotoyori 463

Influence of the Thickness on the Thermal Degradation of PMMA
C. Vovelle, R. Akrich, J.-L. Delfau, and S. Gresillaud 473

Differences in PMMA Degradation Characteristics and Their Effects
on Its Fire Properties
T. Kashiwagi, A. Inaba, and J. E. Brown 483

People-Fire Interactions

Methods of Design for Means of Egress: Towards a Quantitative Comparison
of National Code Requirements
E. Kendik 497

Leadership and Group Formation in High-Rise Building Evacuations
B. K. Jones and J. A. Hewitt 513

A Case Study of Fire and Evacuation in a Multi-Purpose Office Building,
Osaka, Japan
S. Horiuchi, Y. Murozaki, and A. Hokugo 523

Movement of People on Stairs during a Fire Evacuation Drill—Japanese
Experience in a Highrise Office Building
M. Kagawa, S. Kose, and Y. Morishita 533

Computer Simulations for Total Firesafety Design of the New Japanese Sumo
Wrestling Headquarters and Stadium (Kokugikan)
H. Sato and T. Ouchi 541

Evacuating Schools on Fire
A. F. Van Bogaert 551

Perceived Time Available: The Margin of Safety in Fires
J. D. Sime 561

Initial Reactions to a Fire from a Simple Robotic Device
J. J. Breaux 571

Towards an Integrated Egress/Evacuation Model Using an Open Systems
Approach
H. A. MacLennan 581

Translation of Research into Practice

Translation of Research into Practice
J. J. Keough 593

Translation of Research into Practice: Building Design <i>M. Law</i>	603
Reliability Study on the Lawrence Livermore National Laboratory Water-Supply System <i>H. K. Hasegawa and H. E. Lambert</i>	611
Decision Analysis for Risk Management of Firesafety Hazards <i>F. Noonan</i>	621
Evaluation of the Risk Problem and the Selection of the Optimum Risk Management Solution <i>C. Van Anne</i>	627
Simple and Not So Simple Models for Compartment Fires <i>M. R. Curtat and X. E. Bodart</i>	637
Assessment of Extent and Degree of Thermal Damage to Polymeric Materials in the Three Mile Island Unit 2 Reactor Building <i>N. J. Alvares</i>	647
Exponential Model of Fire Growth <i>G. Ramachandran</i>	657
The Use of a Zone Model in Fire Engineering Application <i>S. Bengtson and B. Hägglund</i>	667
Detection	
Overview on Fire Detection in Japan <i>A. Watanabe, H. Sasaki, and J. Unoki</i>	679
Attenuation of Smoke Detector Alarm Signals in Residential Buildings <i>R. E. Halliwell and M. A. Sultan</i>	689
Detection of Smoldering Fire in Electrical Equipment with High Internal Air Flow <i>H. Hotta and S. Horiuchi</i>	699
Global Soot Growth Model <i>G. W. Mulholland</i>	709
Numerical Simulations of Smoke Movement and Coagulation <i>Y. Yamauchi</i>	719
Dynamic Performance of Pneumatic Tube Type Heat Sensitive Fire Detectors <i>H. O. Luck and N. Deffte</i>	729
Installation and Reliability of a Free Smoke Detector <i>S. Hygge</i>	739

Correlation Filters for Automatic Fire Detection Systems
H. O. Luck 749

Specialized Fire Problems

Historical Aspects of Fires, after Impact, in Vehicles of War
W. Johnson 761

The Thermal Response of Aircraft Cabin Ceiling Materials during a Post-Crash, External Fuel-Spill, Fire Scenario
L. Y. Cooper 775

Evaluation of Aircraft Interior Panels under Full-Scale Cabin Fire Test Conditions
C. P. Sarkos and R. G. Hill 789

Preliminary Test for Full Scale Compartment Fire Test (Lubricant Oil Fire Test: Part 1)
T. Tanaka, Y. Kabasawa, Y. Soutome, and M. Fujizuka 799

Full Scale Compartment Fire Test with Lubricant Oil (Lubricant Oil Fire Test: Part 2)
M. Fujizuka, Y. Kabasawa, Y. Soutome, and J. Morita 809

Fire Safety Research and Measures in Schools in Belgium
A. F. Van Bogaert 819

Fire Spread along Roofs—Some Experimental Studies
K. Ödeen 829

Evaluation of Garment Flammability Using Thermal Mannequins
Y. Uehara and M. Umezawa 839

Burning Rate of Upholstered Chairs in the Center, alongside a Wall and in the Corner of a Compartment
T. Mizuno and K. Kawagoe 849

Cable-Fire Tests under the Raised Floor of Data-Processing Installations
K. Martin 859

Spray Fire Tests with Hydraulic Fluids
G. Holmstedt and H. Persson 869

A Study on the Fire Spread Model of Wooden Buildings in Japan
Y. Namba and K. Yasuno 881

Full Scale Test of Smoke Leakage from Doors of a Highrise Apartment
O. Sugawa, I. Ogahara, K. Ozaki, H. Sato, and I. Hasegawa 891

External Radiation at a Full Scale Fire Experiment <i>I. Tsukagoshi and E. Itoigawa</i>	901
Oil Pool Fire Experiment <i>T. Yamaguchi and K. Wakasa</i>	911
The Behaviour of Heavy Gas and Particulate Clouds <i>R. J. Bettis, G. M. Makhviladze, and P. F. Nolan</i>	919
An Event Tree Model for Estimation of Fire Outbreak Risks in Case of a Large-Scale Earthquake <i>H. Kaji and T. Komura</i>	931
Statistics, Risk, and System Analysis	
Towards a Systemic Approach to Fire Safety <i>A. N. Beard</i>	943
The Use of Probabilistic Networks for Analysis of Smoke Spread and the Egress of People in Buildings <i>W.-C. T. Ling and R. B. Williamson</i>	953
Reliability and Maintainability for Fire Protection Systems <i>H. D. Boyd and C. A. Locurto</i>	963
Fire Following Earthquake <i>C. Scawthorn</i>	971
CIB-Concept for Probability Based Structural Fire Safety Design <i>L. Twilt and A. Vrouwenvelder</i>	981
Risk Analysis Using the Engineering Method for Building Firesafety <i>R. W. Fitzgerald</i>	993
The Development and Use of the United Kingdom Home Office Fire Cover Model <i>G. H. Dessent and J. A. Harwood</i>	1003
National Fire Costs—A Wasteful Past but a Better Future <i>T. Wilmot</i>	1009
Investment Model of Fire Protection Equipment for Office Building <i>H. Nakamura</i>	1019
Risk Management Application of Fire Risk Analysis <i>M. Kazarians, N. Siu, and G. Apostolakis</i>	1029
Some Probabilistic Aspects of Fire Risk Analysis for Nuclear Power Plants <i>G. Apostolakis</i>	1039

A Probabilistic Method for Optimization of Fire Safety in Nuclear Power Plants
D. Hosser and W. Sprey 1047

Smoke Toxicity and Toxic Hazard

Mathematical Modeling of Toxicological Effects of Fire Gases
G. E. Hartzell, D. N. Priest, and W. G. Switzer 1059

Toxicity Testing of Fire Effluents in Japan: State of the Art Review
F. Saito and S. Yusa 1069

Thermal Decomposition of Poly(Vinyl Chloride): Kinetics of Generation and Decay of Hydrogen Chloride in Large and Small Systems and the Effect of Humidity

C. A. Bertelo, W. F. Carroll, Jr., M. M. Hirschler, and G. F. Smith 1079

Quantitative Determination of Smoke Toxicity Hazard—A Practical Approach for Current Use

R. W. Bukowski 1089

The Effects of Fire Products on Escape Capability in Primates and Human Fire Victims

D. A. Purser 1101

Toxicity of the Combustion Products from a Flexible Polyurethane Foam and Polyester Fabric Evaluated Separately and Together by the NBS Toxicity Test Method

B. C. Levin, M. Paabo, C. S. Bailey, and S. E. Harris 1111

Calculation of Smoke Movement in Building in Case of Fire

T. Matsushita, H. Fukai, and T. Terai 1123

Effects of Combustion Gases on Escape Performance of the Baboon and the Rat

H. L. Kaplan 1133

Suppression

The Extinction of Fire with Plain Water: A Review
D. J. Rasbash 1145

Investigation of Spray Patterns of Selected Sprinklers with the FMRC Drop Size Measuring System

H.-Z. You 1165

Extinguishment of Rack Storage Fires of Corrugated Cartons Using Water
J. L. Lee 1177

Fire Extinguishing Time by Sprinkler

J. Unoki 1187

Experiments and Theory in the Extinction of a Wood Crib

S. Takahashi 1197

Analysis of Fire Suppression Effectiveness Using a Physically Based Computer Simulation

L. M. Pietrzak and G. A. Johanson 1207

Author Index 1217

Subject Index 1220