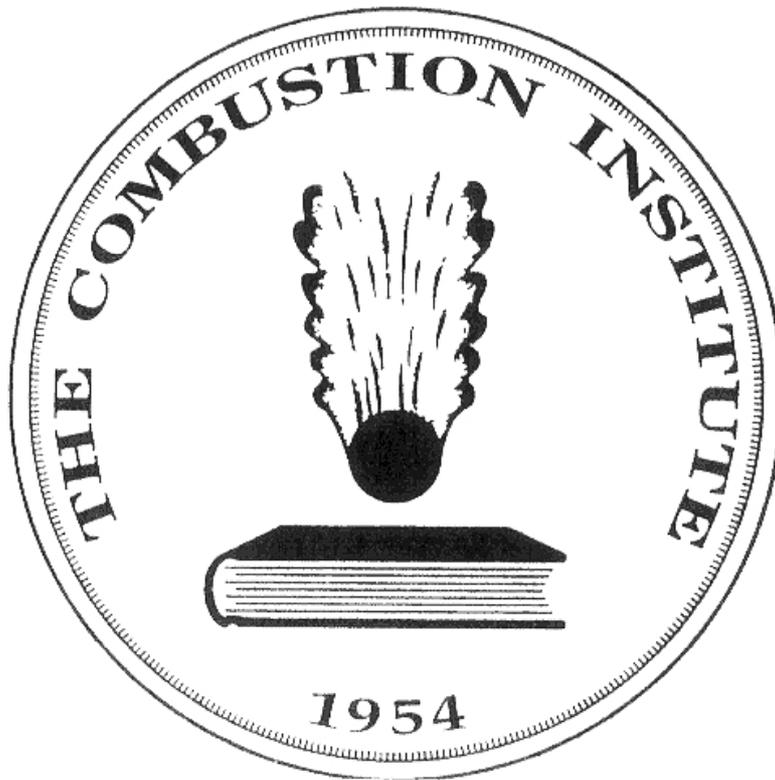


THE COMBUSTION INSTITUTE

(British Section)



NEWSLETTER

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THE BRITISH SECTION OF THE COMBUSTION INSTITUTE

For a modest fee there are many benefits:-

- substantial travel grants to Combustion Symposia and other meetings
- reduced fees at Section-sponsored meetings
- reduced subscriptions to several combustion journals
- the Section's Newsletter
- and a chance to meet like-minded people

Please encourage associates to join the Section, especially research students recruited at the start of this academic year

Details from the Hon. Secretary, Professor Simone Hochgreb.
E-mail: sh372@cam.ac.uk

or download application forms from

<http://www.combustion.org.uk/membership.html>

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EDITORIAL

Six members of the committee are due to step down this summer. Grigor Makhviladze, Guillermo Rein and Roger Stone are eligible for re-election, whereas Roger Cracknell, Bill Jones and Kevin Hughes are not. Given this large number, to spread out more evenly our elections to the committee, it was agreed that Kevin and Bill will be co-opted for one year. This means that before the next AGM, elections will be held for 4 vacancies.

A proposal will be made at the next AGM to amend the Section Rules to formally increase the number of elected members from 6 to 9, to aim for 3 people being elected to the committee in each year. A separate note will be sent out to members as a reminder of this year's elections to the committee and to encouraging nominations.

The committee has agreed to offer life-membership to those aged over 60 at a cost of 25 times the annual retired membership, *i.e.* now $25 \times \pounds 15 = \pounds 375$. This will be advertised on a revised membership form, to be updated by Kevin Hughes. For those under the age of 60, life-membership will only be offered to those requesting it, at 25 times the regular membership, *i.e.* now $25 \times \pounds 30 = \pounds 750$.

Finally, may I remind you to send details of your publications for 2010 to Kevin Hughes. To ease his (and my) task, please could they be formatted with the surname of the first author, followed by other authors names, paper title and journal / book, then with the publication details.

John Griffiths

CORRECTIONS AND EXPLANATIONS

Unfortunately, my less than satisfactory performance in production of the Autumn 2010 Newsletter has caused me to include a column to emulate the one which, notoriously, appears in the "Guardian" on a regular basis. I hope that it is not to become a frequent feature of this publication.

First, I apologise to Dr. Jun Xia, Brunel University, for omitting his contribution to the reflections of the 33rd International Symposium on Combustion, in Beijing. Jun had said that, closely following the start of his lectureship at Brunel University, the opportunity to attend the symposium was an inspiring experience. He was impressed by many of the presentations, representing the cutting-edge theoretical, computational and experimental work in both traditional and innovative areas of combustion science and technology.

Secondly, I apologise to all members, and especially those who were bemused to learn that they had attended the Section AGM in October and to others who found that they had been removed from the record. This arose for my carelessness in confusing two lists of attendees, so publishing the wrong one. For the record, my understanding is that members present at the 2010 AGM were

Alan Bayley	Thomas Dunstan	Stephen Marshall
Ghenadie Bulat	Yannis Hardalupas	Salvador Navarro-Martinez
Stewart Cant	Simone Hochgreb	Oluwatoyin Omojola
Davide E Cavaliere	Arvind Jasuja	Christopher Priddin
Cheng Tung Chong	Bryn Jones	Guillermo Rein
Chris Coats	Karthik Kashinath	David Smith
Stewart Cant	Johannes Kerl	Thomas Sponfeldner
Jose L T Cullen	Isil A Kilinc	S N Swaminathan
Oliver Darbyshire	Chris Lawn	Peter Stephenson
Mike Davies	Camille Letty	Jamie Turner
James Dawson	Kian Min Lim	Konstantina Vogiatzaki
David Dennis	Kexin Liu	Mohd F M Yasin

Please be assured that the correct list has been recorded by Simone Hochgreb, in the formal records of the meeting.

COMBUSTION PEOPLE

Allan Hayhurst

At the 33rd International Symposium on Combustion, Allan received The Alfred C Egerton Medal, which is awarded "for distinguished, continuing and encouraging contributions to the field of combustion".

The citation reads "For brilliant contributions in several diverse aspects of combustion science, particularly ionisation, pollutants, fluidised bed combustion and chemical looping". I am sure that I speak for all members when I offer congratulations to Allan for this honour and for the reflected glory that is conferred on the British Section.

Chris Morley

A presentation was made by Roger Cracknell to Chris Morley in September, in gratitude for his considerable service in the British Section over many years. Here is a record of the event, which took place at Shell Global Solutions, Thornton, in 2010. The "cast" from left to right are Andrzej Pekalski, Derek Bradley, Roger Cracknell, Chris Morley, Gautam Kalghatgi and Neal Morgan.



Clifford Jones

Notwithstanding his formal educational background as a chemist, Clifford has been elected as Fellow of the Institution of Mechanical Engineers, partly on the basis of his academic contributions to the oil and gas production industry.

Ken Basden

Dr Ken Basden, who was a long standing (and probably a founding) member of the Australian Section of the Combustion Institute, died in December 2010. From his base at the University of NSW he was a frequent participant at meetings, including the 17th Symposium that was held in Leeds in 1978, as well as being active in his local Section. As a "coal" expert, he was known to Professor Thring's research group, at Nottingham, and had a sabbatical in England at the BCURA Leatherhead site.

More about Graham Dixon-Lewis

Finally, not forgetting the recent loss of our dear colleague, Graham Dixon-Lewis, I am reproducing some recollections sent by Ela Bulewicz, to our Chairman, soon after we learned of his death.

"Dear Allan.

Sad indeed. I first met Graham Dixon-Lewis in the USA, at the time of one of the Symposia - either at Salt Lake City or in Pennsylvania. He lost all his money and Travellers Cheques. His glasses dangled on a bit of elastic and he seemed completely helpless on things practical. Morris et al. (*i.e Morris Sugden. Ed.*) organised a collection to help him get back. Some weeks after we returned to Cambridge a cheque arrived, with a nice "thank you" note. Not so absent minded as some thought he could sit at a conference looking half asleep and then ask a searching question.

Later I saw him at various places, including Moscow. In 1987, at the Academy of Sciences Hotel the Receptionist was painfully slow and when I arrived Dixon-Lewis was just sitting on his suitcase, quite forgotten and apparently dozing. He visited Poland several times, but I think that only Prof. Kordylewski, who spent some time as a Research Fellow at Leeds (*in the School of Chemistry with Peter Gray and colleagues. Ed.*) and myself knew how distinguished he was.

He changed remarkably little over the years. The last time I saw him was at Edinburgh, in 2000 - coming down from Arthur's Seat, looking quite fresh, as Gosia and I were going up. His modesty, in spite of his scientific position had something touching and almost "other wordly" about it. He deserved enormous respect, but never demanded it. The world would be a better place with more people like him.

Best regards, Ela"

THE ELDER STATESMEN

Ela's remarks reminded me that, some time ago, I had mused on how many of the current membership of the Section may well have been members continuously from its foundation, around 1954. Unfortunately, the changes in how records have been archived, and also the completeness in which they have been passed

through successive Secretaries over so many decades, does not make this an easy question to resolve. I have compiled the names of the people whom I think probably come into this illustrious group. I apologise unreservedly if I have missed anyone from my list, and I would be thrilled to learn of other names that should be added. Of course, Graham would certainly have been included, had I acted on my initial impulse.

The people whose names will be most familiar, and who will be known to many members, are Derek Bradley, Ken Bray, Peter Gray and Felix Weinberg. Someone else, who has moved out of the limelight in recent years, is Roy Baldwin. Surely Roy's name is still very familiar to younger members who are involved in modelling of combustion kinetics? Roy's astonishingly precise and careful experimental work (with Ray Walker) remains a cornerstone to the kinetic foundations for the understanding and interpretation of hydrogen, carbon monoxide and hydrocarbon combustion.

Then there is Ken Palmer, who was a prolific contributor to this Newsletter when Tony Burgess was its editor. (How I would value that support!) A considerable proportion of Ken's professional life was at the Fire Research Station, at Boreham Wood, which became part of the Building Research Station. If I remember correctly, Ken was Director of the Fire Research Station at and after that transition, and held posts as Visiting Professor at UK universities.

Two other elder statesmen come to mind who are, perhaps, less well-known. The first is Dudley Lewis, who held senior posts at the Rocket Propulsion Establishment, Westcott, for much of his professional life. Our paths crossed in the early '70s, through work that was supported at Leeds by RPS. In fact, the Leeds rapid compression machine came into being through that contract and provided a "good living" for me for more than 30 years thereafter. The machine is still operational, under the direction of Gary Sharpe and Malcolm Lawes. The second is David Napier, who was a contributor to the Fifth International Symposium, in 1954, when he worked at the British Coal Utilisation Research Association, Leatherhead. David is a very long term resident of Canada, but still maintains his membership of the Section. He will be known to those who have interests in fire and explosion hazards in industry, through LNG gas spills and related events.

John Griffiths

Hinshelwood Prize 2009: Guillermo Rein

As was announced at the AGM, October 2010, Guillermo was awarded the Hinshelwood Prize for 2009. In acknowledgement of his distinguished career so far, I am pleased to publish this summary of his record. I am also very pleased to note that the University of Edinburgh has also recognised his achievements, through his promotion to Senior lecturer subsequent to our award being made. Congratulations on both counts, Guillermo!

Guillermo is currently a Senior Lecturer in Mechanical Engineering at the University of Edinburgh and a Royal Academy of Engineering/Leverhulme Trust Senior Research Fellow. He obtained his first degree in Spain, from ICAI Pontificia de Comillas, Madrid (1999). After two years doing industrial research on thermal and structural problems, he went to study for a MSc and PhD in combustion at the University California at Berkeley (2001-2005), where he worked in the modelling of reactive porous media and smouldering combustion under sponsorship of the NASA Flight Program. NASA has concerns on the fire safety of manned space missions and, in the absence of gravity, smouldering fires pose the largest risk.

Since obtaining his first academic position at University of Edinburgh, his research has focused on understanding the thermofluids of reactive solid materials and their role in global energy and environmental problems, and infrastructure protection. For example, he has contributed to resolution of the problem of fossil-fuel burning from accidental and natural sources (mainly coal and peat fires), which are important contributors to the world energy and climate change crisis. Another emphasis of his most recent research is related to geo-engineering, in which he is working on the design of stable facilities for very long-term storage of sequestered carbon in the solid phase (biochar).

In 2010 Guillermo was awarded a Royal Academy of Engineering/Leverhulme Trust grant to conduct research in "Greenhouse Gas Emissions from Subsurface Peat Fires", a novel and far reaching topic with multidisciplinary implications that has been largely ignored to date. In addition, Guillermo has been a consultant for industry since 2001, with clients in USA, UK, Spain, Italy, Belgium and Korea. He is the author of 33 journal papers (including contributions to Nature, Geoscience and Proceedings of the National Academy of Sciences) and more than 112 conference communications. His work has been recognized internationally with a number of research awards (e.g. Lloyd's Science of Risk, Lord Ezra Award, Distinguished Paper on Fire Research at 32nd International Symposium on Combustion) and has recently been featured in international media (e.g. New York Times, BBC, Associate Press, DotEarth NYT.com, El Pais).

Hinshelwood Prize 2011

The Hinshelwood Prize for Combustion recognises meritorious work, in any branch of combustion, by a younger member of The British Section of The Combustion Institute. One aim of this annual prize is to encourage young people, not as yet well established researchers, but who work in any area or aspect of combustion. In addition, the prize commemorates Sir Cyril Hinshelwood, who shared the Nobel Prize for Chemistry in 1956 for his work on the combustion of hydrogen. Preference will be given to candidates under the age of 35 years on the deadline for nominations.

Written nominations, which may be submitted by anyone who knows the work of the nominee, must be received by the Secretary of The British Section no later than 31 December in each year. Nominations should include the *curriculum vitae* and list of publications of the nominee and also a brief account (no more than two pages of A4) of that person's achievements including description of accomplishments in industry if it is appropriate.

The award shall be of a certificate and a sum of £300. Normally one award shall be made each year; however, no award will be made, if, in the opinion of the panel of judges, a candidate of sufficient merit has not been proposed.

Each year the Committee of The British Section will nominate a panel, normally of three judges, who will be experts in different aspects of combustion. The chairman of the panel will be a member of the Section's Committee. The panel of judges shall co-opt extra members if they deem it necessary to select the winner of the prize. The Award shall be presented at the next Annual General Meeting of The British Section.

Report on the Autumn Meeting and Annual General Meeting of the British Section of the Combustion Institute

***Combustion In Gas Turbines: Present And Future Challenges* University of Cambridge**

A one-day meeting took place was organized, by Simone Hochgreb, at the University of Cambridge on *Combustion In Gas Turbines: Present And Future Challenges*. The meeting was co-sponsored by the EU-funded Marie-Curie Network AETHER (AEro-acoustical and THERmo-acoustical coupling in enERgy processes), as well as by OxSensis. Seven speakers from the UK and Europe, from academia and industry were invited to give talks on the subject. Laurent Gicquel from CERFACS showed impressive calculations of full engine LES, showing how swirl is induced in the chamber annulus. Ruud Eggels from Rolls-Royce Deutschland described how swirl and sprays interact in subtle ways to give an optimal swirl for best mixing. Khaward Syed from Alstom showed new results on syngas and flue gas recirculation use in gas turbines. Bill Jones from Imperial College described new stochastic solution methods to CFD. Nondas Mastorakos from Cambridge demonstrated how simple experiments and model can give great insight into gas turbine ignition. Christoph Hirsch from TU Munich showed how significantly confinement affects flame dynamics. Finally, Rob Miller from the Whittle lab at Cambridge showed how pressure gain combustion can achieve significant efficiency gains in propulsion. The meeting offered a very lively discussion throughout the day, and was a good opportunity for members to get a rounded view of the current state of the art in gas turbine technology. The total attendance was 53, excluding speakers, of which 17 were PhD students. A net income to the CIBS of £1,963 was made possible due to the co-sponsorship of the event.

Simone Hochgreb

BRITISH SECTION AUTUMN MEETING AND AGM

“CLEAN COAL”

Leeds University, 6 September, 2011

The meeting is being organised by Professors Alan Williams and Mohamed Pourkashanian, and Dr Kevin Hughes. More information will be circulated in due course.

ECM 2011: 5th European Combustion Meeting Cardiff University

28th June - 1st July 2011

<http://www.ecm2011.org>

The organization of the ECM has proceeded smoothly, thanks to a very good team at Cardiff. Altogether 408 abstracts were received and 407 accepted. Subsequently 15 papers were withdrawn. At the most recent report, 316 papers had been received; the others were being chased. The schedule for the poster sessions is currently being prepared. Some sponsorship has been raised and 7 firms will mount exhibitions. Two satellite meetings, one before and one after the ECM, are being organized, details below.

Seven research students have been awarded grants of £250 each to attend the meeting.

Kian Min Lim	Cambridge University
Mohammad Pezeshki	Southampton University
Seyed Ali Hadavi	Leeds University
Stefan Wysocki	Imperial College London
Mengchen Hu	Oxford University
Huayoung Zhao	Oxford University
Ruigang Zhou	Cambridge University

Associated Meetings

The **1st Topical Workshop, "Methods for Model Simplification, Evaluation and Improvement"**, will be held in the School of Engineering building on Tuesday 28th June 2011.

The **1st Heat Flux Burner Workshop, "Determination of Laminar Burning Velocities"**, will be held in the School of Engineering, Cardiff, lecture theatre south 1.22, on Friday 1st July 2011. Its programme is as follows

Programme

Welcome: Prof. Philip de Goey and Stefan Voss

Overview and Fundamentals of the Heat Flux Method

Prof. Philip de Goey, TU Eindhoven, Netherlands, 30 min

Validation of Reaction Mechanisms

Prof. Alexander Konnov, Lund University, Sweden, 30 min

Strategies and further Investigations for Laminar Burning Velocities

(10 min presentations)

Patricia Dirrenberger, CNRS-LRGP, Nancy, France

Prof. Alexander Konnov, Lund University, Sweden

Dr. Roy Hermanns, OWI, Aachen, Germany

Prof. Dimosthenis Trimis, Prof. Christian Hasse, TU Bergakademie Freiberg, Freiberg, Germany

Mayuri Goswami, TU Eindhoven, Eindhoven, Netherlands

Open Discussion

HAS THE UK FORGOTTEN HOW TO DO COMBUSTION SCIENCE?

Introduction

You have prepared your manuscript for a Combustion Symposium, discussed it with your co-authors, and performed the most taxing test of your mental faculties for the year. Of course, here I am talking about getting the word count done, not writing the paper. You then send it off, and the waiting begins... For the first couple of months, the paper nags at you: did I do this correctly, was it clear enough? Then, you forget about it. Months pass.

Then, one day, an e-mail arrives. Heart pounding, you open it.

p_a = "WHAT THE DEVIL? Who chose these morons?"

p_b = "Fantastic! What excellent reviewers, and what a good Symposium session chair".

Those of you who attended the 33rd Symposium may have noted that p_a was quite high (on a historical basis) for the UK, whereas p_b was quite low. Of course, there are always grumbles about the standard of refereeing, though this year there has been a larger than usual number reaching your humble correspondent's ears. For interest, the success rates for submitted papers are reproduced below, grouped in a number of different ways, and including some data from the 32nd Symposium.

Success Rates

Table 1. Success rates for the Symposium in general
(32nd Symposium data from Jan 09 British Section Newsletter)

	33 rd Symposium	32 nd Symposium
Total number of submissions to Symposium	1051	714
Oral presentations	381	
Number of papers for which revisions were requested	439	
Rejected papers without revisions requested	612	
Withdrawn papers (accepted for oral presentation)	2	
Papers that had more than one revision	35	
Number of rejected revised papers	38	
Number of accepted papers	366	556

Table 2. Success rates by country for the last two Symposia

	33 rd Symposium			32 nd Symposium		
	Submitted	Accepted	Success (%)	Submitted	Accepted	Success (%)
Australia	23	13	56.5			
China	243	37	15.2	88	42	47.7
France	48	27	56.3	43	37	86
Germany	52	21	40.4	39	33	84.6
Italy	24	7	29.2	26	21	80.8
Japan	110	46	41.8	86	57	66
UK	73	25	34.2	55	48	87.2
USA	264	141	53.4	225	196	87.1

The massive increase in submissions for the 33rd Symposium, relative to the 32nd Symposium, reduced the potential for acceptance, but France and the USA maintained position as the front runners, with Australia also having strong representation, whereas the UK's acceptance rate was somewhat below average (34.2 % in 2010) and much lower than at the previous Symposium (87.2 % in 2008).

Table 3. Overall success 33rd Symposium, by Colloquia

	Submitted	Accepted	Accepted (%)
Kinetics	99	46	46.5
Soot & PAH	53	22	41.5
Diagnostics	47	17	36.2
Laminar flames	116	45	38.8
Turbulent flames	132	48	36.4
Heterogeneous	118	38	32.2
Sprays & droplets	57	21	36.8
Detonations	66	28	42.4
Fire	77	28	36.4
Stationary	69	22	31.9
Engines	94	33	35.1
New Technology	108	36	33.3
TOTAL	1051	384	36.5

Conspicuous in the success rate, when presented in the context of the colloquia, is the high proportion of accepted papers for detonations, kinetics research and soot related studies. Investigators of heterogeneous combustion and stationary combustion systems seem to have a particularly hard time. Although there is no compelling reason for success rates to be the same for each colloquium, the number of submissions to each one is certainly a reflection of the trends in combustion research activity.

Discussion

Four main possibilities come to mind as to why the British section has such a low overall success rate, even if it continues to have a similar *total* number of papers accepted to e.g. France and Germany.

1. Britain no longer does world-leading research in combustion science
2. Britain does research in the wrong areas

3. There is bias in the system
4. France, the USA and Australia are better prepared for the Symposia

Does Britain no Longer do World-Leading Research in Combustion? If not, why not?

If we leave out the hideous possibility that we are not as clever as we think, we need to consider whether we have adequate facilities in the UK for world-leading combustion research. Perhaps the community, accustomed to fighting each other for acceptance for a Combustion Symposium, fights itself too vehemently when it comes to reviewing grant proposals? The evidence from funding councils is that engineering disciplines review each other more harshly than others – but that they do not take into account the relative harshness of reviews within a particular discipline when awarding grants. Perhaps as a community we should take heed of certain other areas of research... those where everyone, uniformly, is world leading. The community knows that combustion underpins modern society: where would power generation or transportation be without our work? Which is more important? Combustion or nanotechnology? Which trumpets its achievements better and secures guaranteed funding in the UK? Why?

The imminent demise of BCURA as a funding agency shows just how far the star of combustion has fallen. In years gone by, the UK had the CRE and other similar establishments for electricity generation, gas and nuclear energy. Now, we have next to no centralised research facilities, and industry complains that the shortage of skilled engineers in the UK forces them to recruit from outside the EU. The combustion community needs to work collectively to promote our achievements and to explain how we can contribute to the very real challenges facing us in the next decades. Combustion scientists need to show that we are part of the clean energy solution, not the problem.

Does Britain do research in the wrong area?

A brief survey of the papers accepted for the Symposium this year from Britain (i.e. those that receiving a travel grant from the British section) indicates that Britain has particular strength in modelling (particularly LES) and flames. Of course, there is immense survivor bias in these results, since they are accepted papers, not submitted ones. (It might be helpful for the British section to request that members send details not just of accepted papers to the British section office, but also of submitted papers). It is worrying that whilst the UK still retains great strength in the field of heterogeneous combustion (amongst other fields), papers are not being accepted for publication in this colloquium. It would be interesting to see if this was caused by non-submission or by non-acceptance. Certainly, discussion with a number of eminent scientists in this area leads to the suspicion that the quality of the peer review process in certain areas is seen as a significant barrier. Furthermore, some have indicated that they do not submit papers to a Symposium because it is seen as increasingly non-relevant to industry.

Finally, the large numbers of papers which are written on the basis of shock-tube measurements would indicate that there is a relevance of this research field. It was an area which had tremendous strength in the UK, in earlier decades, but the kinetics aspect has declined to negligible activity. Fortunately, outstanding research in detonation related studies is still active. Numerical simulations of the results from a number of different types of shock tubes, along with jet-stirred reactors, etc, are world-leading. Surely, we need to obtain the facilities to conduct these experiments ourselves, rather than relying upon our colleagues around the world?

Bias

Table 3 shows that the acceptance rates in certain areas were very high at the most recent Symposium. The Institute as a whole seems at the moment to have a great deal of positive reinforcement in these fields – an extremely eminent member of the Institute recently made the statement that “we should only be doing research in *important* fields”. He then outlined which fields were important... the areas into which the Combustion Institute is more and more moving. Some might consider that the success rates indicate a bias in favour of kinetics research, though others would argue that the standards of this research, historically high, have simply been maintained. It is also possible that the standards of reviewing are superior in this field. (*Over very many Symposia, my recollection is one of a proportionately greater success with submissions to Kinetics than to other colloquia. Perhaps crossing the boundaries from my combustion kinetics background was never going to be easy – yet the Combustion Symposia have seemed to me to be a natural forum for this to happen. Perhaps better scientists than me have a different story to tell. Ed.*)

Given that the UK retains or is building significant research capability in industrial areas (such as Doosan-Babcock's oxyfuel demonstration plant in Renfrew) and also that the Combustion Institute as a whole is worried at the highest levels about the rapid decline in the submission of papers from industry into the Symposia, perhaps the British Section should work hard to encourage the submission of papers from our industrial colleagues. It might also make sense to encourage British industrialists to take a stronger role in the British section and in time the highest echelons of the Institute. This might help to bolster our position in, for example, stationary combustion.

Finally, it is interesting to note the opacity of the methods chosen to add new members to the worldwide committee of the Combustion Institute. The Catholic Church seems to have stolen a march on the combustion community by signalling the new pope using coloured smoke. Many other features of the selection process appear to be similar.

Preparation for the Symposia

Reports indicate that the US Sections in particular are far better prepared for the International Symposia. Interesting Symposium-worthy material is, often, first presented at American Section meetings and comments sought well ahead of time on the potential for improvement. Furthermore, it was clear from the comments of the co-chairs in the introduction to the Symposium that what they were looking for was a *clear message* from the paper. It is possible that in the UK we are not so accustomed to writing the short, punchy, papers which are now required for a Symposium; perhaps we need to begin preparation of our papers with this in mind, rather than initially writing long papers and agonising over how to prune them to the word limit.

Conclusions

The underperformance of the British section (at least on a historical basis, and based on success rate rather than total number of accepted papers) is noteworthy. Some possible reasons for this have been explored. It is clear that the Combustion Institute has been moving in one particular direction for a number of years. Whether the British Section can do anything about this is unclear (even if we should want to - which is a topic that should be debated). Securing funding for combustion research is vital, particularly in the current environment. The countries who are outperforming the UK invest more money in combustion research, so that working together to promote combustion research in the UK and secure this outcome may be a key factor.

Paul Fennell

Forecasting Fire Growth

Guillermo Rein, University of Edinburgh

We published recently a paper in *Fire Safety Journal* titled "**Forecasting Fire Growth using an Inverse Zone Modelling Approach**" reporting the latest progress on a novel technology. The idea is based on the fact that effective control of a fire saves lives and money. When fire fighters manage to put out a fire before it grows out of proportions, live safety is greatly increased and significant damage can be avoided. Moreover, the affected building can be re-occupied without major investment of resources. But when a fire passes a certain size, the building might collapse as a consequence of the fire damage to the structure (eg, 2001 WTC or 2005 Windsor Tower) or might have to be demolished due to irreversible damages.

Due to a lack of the required technology to support emergency response, fire fighters often have to follow their intuition when it comes to attacking the fire instead of basing their decisions on knowledge of the actual fire. This lack of information can lead to lost opportunities or unnecessary risks.

Prediction of the ongoing fire development ahead of time under different possible conditions based on the current events taking place would give fire fighters insight into the dynamics of the particular fire being fought. With this extra knowledge, they could weight other options and feed more information into the emergency management. However, fire dynamics follow complex physical processes closely coupled to one another, which makes current tools not able to accurately forecast fire development in real time.

This emerging technology is called *Sensor Assisted Fire Fighting* [2] and aims at providing physics-based forecasts of fire development by combining measurements from sensors in the fire compartment with a range of computational modelling tools. The sensor measurements can provide essential lacking information and compensate the accuracy lost, and thus overcome the shortcomings of current modelling tools and speed them up. The proposed methodology is to collect measurements in the fire compartment, and to assimilate this data into the computational model.

When enough measurements are available to characterize the current fire, a forecast is made. This forecast is then constantly updated with new incoming data. If, for example, a door is opened or glazing breaks, and the ventilation conditions change drastically, the sensor measurements will steer the computational model towards capturing the new conditions. With this technology, fire fighters could act upon forecast behaviour.

The paper presents one of the first steps in this direction. Data is assimilated into a simple zone model, and forecasts of the fire development are made. Positive lead times are reported here for the first time. These results are an important step towards the forecast of fire dynamics to assist the emergency response. Together with the application to Computational Fluid Dynamics within the same PhD thesis [3], the previous work of Cowlard et al. [4] on small-scale flame spread predictions and of Koo et al. [5] on probabilistic compartment fire models, these establish the basis for technology for sensor assisted fire fighting. The envisioned system is not yet fit for operational purposes and further research is needed. The investigation of the effects of adding further realism in the fire scenarios will be the focus of future studies.

References:

- [1] W Jahn, G Rein, JL Torero, Forecasting Fire Growth using an Inverse Zone Modelling Approach, Fire Safety Journal, (in press) 2010. doi:10.1016/j.firesaf.2010.10.001.
- [2] A Cowlard, W Jahn, CA Empis, G Rein, JL Torero, Sensor Assisted Fire Fighting, Fire Technology 46 (3), 2010. doi:10.1007/s10694-008-0069-1
- [3] W Jahn, Inverse Modelling to Forecast Enclosure Fire Dynamics, PhD Thesis, School of Engineering, University of Edinburgh, 2010. <http://www.era.lib.ed.ac.uk/handle/1842/3418>
- [4] A Cowlard, Sensor and model integration for the rapid prediction of concurrent flow flame spread, PhD Thesis, University of Edinburgh, 2009. <http://www.era.lib.ed.ac.uk/handle/1842/2753>
- [5] S Koo, J Fraser-Mitchell, S Welch, 2010. Sensor-steered fire simulation Fire Safety Journal 45 (3), pp.193-205, 2010. doi:10.1016/j.firesaf.2010.02.003

COMBUSTION UK BLOG

Since April 2010, the British Section website has been expanded with a blog, set up and administered by Guillermo Rein.

For those who are not familiar, as defined by wikipedia, "[a blog provides] entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order. [...] Many blogs provide commentary or news on a particular subject [...]. A typical blog combines text, images, and links to other blogs, Web pages, and other media related to its topic".

There are 26 posts so far, most of them about combustion events. Current monthly visits vary from 30 to 130 with average around 70, and most visitors are from US and UK. But few members know about its existence. Please take a look at <http://combustion-uk.blogspot.com>

If you want to contribute to the content or know of an incoming combustion event, please let Guillermo know. Of course, comments and hints for improvements are most welcome. If you want to receive an automatic email when an announcement is posted, send your address to G.Rein@ed.ac.uk.

COMBUSTION LINKS AND CALENDAR

<http://www.combustioninstitute.org>; <http://www.combustion.org.uk>;
<http://combustion-uk.blogspot.com>
<http://www.afm.asso.fr>; <http://ukelg.ps.ic.ac.uk/>;
<http://www.iop.org/activity/groups/subject/comb/index.html> <http://www.see.ed.ac.uk/fire/links.html>

2011

28 June - 1 July

University of Cardiff, Cardiff, UK

ECM 2011: 5th European Combustion Meeting

Details: <http://www.ecm2011.org/>

24-29 July

Irvine, California, USA

23rd International Colloquium on the Dynamics of Explosions and Reactive Systems

Details: <http://icders2011.eng.uci.edu/node/1>

The deadline for initial submissions is December 15, 2010

6 September, 2011

Leeds University

British Section Autumn Meeting and AGM, "Clean Coal"

Details: as noted on p10

10-11 September 2011

Chia Laguna Resort, Domus de Maria, Cagliari, Sardinia, Italy

Advanced Measurement Techniques and Computational Method for Premixed and Partially Premixed Combustion

Details: http://www.numeca.com/workshop_combustion_sardinia2011/

12-15 September

Warsaw, Poland

13th European Turbulence Conference (ETC13)

Details: <http://etc13.fuw.edu.pl/papers/call-papers>.

23 September

Cavendish Laboratory, University of Cambridge

47th UKELG discussion meeting on “Condensed and Gas Phase Detonations”

Details: <http://ukelg.ps.ic.ac.uk/> or Roger Santon, UKELG Secretary at r.santon@btinternet.com.

Contributions no later than 25th August 2011

2012

34th International Combustion Symposium, Warsaw

The dates of the Symposium are still not set on the website but have been advertised as 29 July - 3 August, 2012.

John Griffiths