

A History of the Dundee Numerical Analysis Conferences

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1 Introduction

The series of numerical analysis conferences held every two years in Dundee is part of the UK numerical analysis scene, if not of a wider picture. With the 21st meeting having taken place in 2005, marking the 40th anniversary, it seems that some sort of historical record might be of interest, and as my involvement has spanned all of the relevant period, I thought that maybe I should attempt this.

Without doubt, the most influential person in the story is Ron Mitchell. Ron completed his PhD at St Andrews University in 1950. His thesis was concerned with relaxation methods in compressible flow, but he developed an interest in numerical analysis, initially as a means of tackling fluid dynamics problems using Southwell's relaxation methods. He stayed on at St Andrews as a Lecturer and taught an Honours special topic in numerical analysis in 1953-54, the first time numerical analysis had been taught in St Andrews. Jack Lambert was appointed as a Lecturer at St Andrews in 1959, and in 1963 Graeme Fairweather and Brian Shaw came as PhD students. Sandy Gourlay started a PhD with Ron in 1964, as did Pat Keast, So there was a thriving numerical analysis group in St Andrews in 1965.

After a BA degree in Melbourne, Mike Osborne was employed as a Scientific Officer for the Royal Australian Navy. He was posted to the UK and spent some time at the Admiralty Research Laboratory (ARL) before doing a PhD at Imperial College. Following spells as Lecturer at the University of Reading and also at Imperial College, he was appointed Assistant Director of the newly founded Computer Unit of the University of Edinburgh in 1963, with Sidney Michaelson as Director. He was mainly interested at that time in finite difference methods for both ordinary and partial differential equations. He was joined in March 1964 by Donald Kershaw, who came from the Mathematics Group at ARL (where for a time they had shared an office) to teach numerical analysis. His main interests were differential and integral equations,

I joined the Computer Unit in October 1964 as a Demonstrator, having just graduated from the University of Edinburgh with a degree in Mathematical Sciences. This included an Honours course in numerical analysis, taught mainly by Jim Fulton, although Mike Osborne contributed some lectures on the numerical solution of differential equations. The way I came to join the Computer Unit was serendipity. I had accepted a job with ICI in Billingham, and was all set to go there. But after my graduation ceremony in

Edinburgh in July 1964, I was passing some time with a class mate, Alex Wight, who had a summer job in the Computer Unit, and he suggested I go round to see the place. Despite the name, there was no computer there at the time, so what I was supposed to see, I'm not sure. Anyway, I met Mike Osborne, and during a conversation with him, he said there was a vacancy for a Demonstrator and indicated that if I was interested, I could likely get it. I explained that I already had a job. However, the idea of remaining in Edinburgh had some appeal, the salary was the same as I was getting from ICI, and there was also an opportunity to study for an MSc. So I thought it over, applied, was offered the job, and wrote to ICI explaining things. I suggested to ICI I might join them later on, but they said just to apply to them again, which of course I never did.

So I started to work with Mike. He was still working mainly on differential equations, but set me to look at linear Chebyshev approximation problems, and the way in which linear programming could be used, as part of an MSc project.

2 The St Andrews years

So in 1965, there were two active groups of numerical analysts in Scotland. Around that time, John Todd and Olga Tausky from California Institute of Technology were visiting Arthur Erdélyi in the Mathematics Department in Edinburgh, and E. T. Copson in St Andrews invited John Todd over there to give a talk. Mike Osborne made a fourth in Arthur Erdélyi's car, and there was a lively conversation, one consequence of which was that a particular signpost "St Andrews 10 miles" was passed several times, and not always in the right direction. After the seminar, Ron and Mike exchanged ideas about the need for more interaction. According to Donald Kershaw, it was Mike Osborne who initiated the idea of a conference. St Andrews was chosen because Ron was friendly with the warden of a particular hall of residence and was able to arrange cheap accommodation before the hall closed for the summer vacation.

There were four on the organising committee, Mike, Ron, Jack Lambert and Donald Kershaw, with Ron and Jack Lambert the main organisers. The Department of Mathematics at St Andrews was very happy to be involved on the basis that if the meeting made a profit, it belonged to the Department, and if it made a loss it came out of the pockets of the organisers. No conference has ever had its financial estimates done more meticulously.

The intention was that participants would only be from Scotland, but in the event it appears that quite a few attended from south of the border, including John Mason from Oxford, Ken Wright from Newcastle, Will McLewin from Manchester and Garry Tee from Lancaster. If there were any records of the meeting, they have not survived, but I still possess a folder (unfortunately the original contents are long gone) with "Symposium on the solution of differential equations, St Andrews, June 1965" written on it. Apparently, around 25 people attended a programme extending over two days, with the four members of the organising committee giving the main talks. Mike talked about the recently described Nordsieck's method being equivalent to a multi-step method, Ron gave a survey talk on ADI methods, and Jack Lambert spoke on some aspect of the numerical solution of ordinary differential equations. Donald Kershaw's talk was about boundary integral or boundary element methods. It had a facetious title, and I remember Ron's introduction, when he said that Donald would try to be discrete while talking about "Indiscrete

methods for partial differential equations”. Other members of the St Andrews group spoke about their work on ADI and high accuracy discretization. Ken Wright spoke on iterative Chebyshev collocation methods for initial value problems. John Mason gave two talks, one on rational approximation in ordinary differential equations and one on using Chebyshev polynomials in partial differential equations.

At the time, the meeting was probably seen as a one-off. Jack Lambert moved to Aberdeen and Mike Osborne left Edinburgh for Australia at the end of 1965. However in 1967 Ron organised a second meeting. This was held from 26-30 June, and called “Colloquium on the numerical solution of differential equations”. There were 85 participants and 18 main speakers, each giving a 50 minute talk: G J Cooper, J Douglas Jr, D J Evans, A R Gourlay, G Hedstrom, J D Lambert, B R Martin, A R Mitchell, K W Morton, J Oliver, M J D Powell, J K Reid, B Shaw, V Thomée, R Sankar, J M Watt, J Whiteman, and K Wright. There were also 19 shorter talks. Apart from Jim Douglas Jr from Rice University in Texas, and Vidar Thomée from Göteborg University in Sweden, who gave main talks, only Barkley Rosser from Wisconsin came from overseas (although he may have been visiting the UK at the time), so it was very much a UK event. John Morris, who came to St Andrews in October 1965 to do a PhD with Ron, helped with the arrangements.



Ron Mitchell (l) and Mike Osborne at the 1997 Conference

3 Continued in Dundee

In 1965, Douglas Jones was appointed to the Ivory Chair of Mathematics in Queen’s College (formerly University College) Dundee. He saw numerical analysis as a growth area, obtained funds to establish a Chair of Numerical Analysis, and in late 1967, Ron Mitchell (then a Reader at St Andrews) was appointed to this chair. The year 1967 also

saw Queen's College sever its links with St Andrews to become the University of Dundee. Jack Lambert joined Ron from Aberdeen as a Senior Lecturer, and from St Andrews, Sandy Gourlay came as a Lecturer and John Morris came as a Research Fellow.

Another conference was organised (this time actually in Dundee!) in 1969. It was called "Conference on the numerical solution of differential equations", attracted 148 participants, and there were eight invited speakers, all from outside the UK: J Albrecht, E G D'Jakonov, B Noble, K Nickel, G Strang, M Urabe, E Vitasek, O Widlund. In total, around 45 participants came from outside the UK, so it was a much more international event: participants came from Austria, Canada, Czechoslovakia, France, Hungary, Italy, Norway and the USA.

The fee for registration and full accommodation in Belmont Hall from Monday to Friday was 18 guineas, which included the conference dinner, morning and afternoon coffee and a set of pre-prints of the lectures. John Morris had by now become the main organiser, and, following a lot of hard work negotiating with publishers, the Proceedings were published for the first time under his Editorship, by Springer Verlag in their Lecture Notes in Mathematics Series (Volume 109). Six of the invited papers were published, along with 21 submitted papers.

I had gone to Australia to do a PhD with Mike Osborne in 1966, and I returned to the UK in September 1969, to take up a Research Fellowship in Dundee. So I just missed the 1969 meeting. My stay in Dundee could have been a short one, but Sandy Gourlay left to work for IBM in 1970, and I was appointed to the vacant Lectureship. David Griffiths came to Dundee as a Lecturer also in 1970.

The academic year 1970-71 was a special one for numerical analysis in Dundee. Ron obtained funding from the UK Science Research Council to promote the theory of numerical methods and to upgrade the study of numerical analysis in British universities and technical colleges. This was done by arranging lecture courses, seminars and conferences in Dundee. Some 34 of the world's leading numerical analysts visited Dundee during this period, some for short periods and others for longer periods up to the full year.

The year began with a Symposium on the Theory of Numerical Analysis during the period 15-23 September, 1970, with speakers Gene Golub, Vidar Thomée, Gene Wachspress and Olof Widlund. This was organised by John Morris, who edited the Proceedings which were published in the Springer Lecture Notes in Mathematics series. There was a Conference on the Applications of Numerical Analysis from 23-26 March, 1971, with 170 participants, 18 one hour lectures by invited speakers and 17 submitted talks given in parallel sessions. Again John Morris was the main organiser and edited the Proceedings (which contained 30 papers), published as before by Springer Verlag. The after dinner speaker at the Conference dinner was Leslie Fox. A Conference on Numerical Methods for Nonlinear Optimization was held from 28 June-1 July, 1971, with 198 participants. I attended to the local organization. Ron, as usual, opened the meeting with some introductory remarks. The after-dinner speaker at the Conference Dinner was Gene Wachspress. The Proceedings were edited by F A Lootsma (a member of the organising committee) and published by Academic Press; twenty nine papers were published. There was a Seminar on Ritz-Galerkin and the Finite Element Method from 8-9 July, 1971, and finally a Conference on the Numerical Solution of Ordinary Differential Equations from 5-6 August, 1971.

In 1973 a Conference on the Numerical Solution of Differential Equations was held from July 3-6. There were 234 participants, with 20 invited speakers, and 43 submitted

papers presented in parallel sessions. For a full list of the invited speakers for this (and the other conferences), see

<http://www.maths.dundee.ac.uk/~naconf/pastspeakers.html>

The after dinner speaker at the Conference Dinner was J H Wilkinson. The conference was organised mainly by John Morris, and I edited the proceedings for the first time, published as before by Springer Verlag. Because of the large number of talks, it was decided that only the papers by the invited speakers would be published, as it was felt to be important to get the Proceedings out quickly. This was a pattern which was continued, with the Proceedings usually available by the end of the year of the Conference. I said in the Preface: “This was the 5th in a series of biennial conferences in numerical analysis, originating in St Andrews University, and held in Dundee since 1969”. So maybe this was the first explicit acknowledgement of the numbering system, and I assume I was interpreting the March, 1971, Conference as being the 4th in the series.

In 1973, Roger Fletcher moved from Harwell to Dundee, broadening the numerical analysis base there. This was reflected in the fact that the 1975 meeting was a Conference on Numerical Analysis, a name which was retained. About 200 people attended the meeting from July 1-4, with 16 invited talks and 45 contributed talks. The after-dinner speaker, introduced as usual by Ron, was A R Curtis. John Morris organised the meeting and I edited the proceedings, again containing the invited papers, and published by Springer Verlag.

So the series was now well into its stride, and with a fairly well established pattern. It survived the departure from Dundee of John Morris, who moved to Waterloo in 1975, leaving me to shoulder the main organisational load. The 1979 Conference obtained some financial support from the European Research Office of the US Army, and this continued until 1991. Apart from this (and funding from SRC during the special year), the meetings are financially self-supporting.

In 1983, I was on sabbatical leave in Australia and New Zealand, and David Griffiths took over the main organization, and also edited the Proceedings. The 1985 meeting was the first which David Griffiths and I jointly organised. We also jointly edited the Proceedings. Following a change of policy by the Springer Editors, we moved to the Pitman Research Notes in Mathematics Series, published at that time by Longman.

It was during the 1989 Conference that Ron took ill, and was rushed to hospital with a suspected heart attack. He missed the Conference Dinner, and at short notice, I took over his job of introducing the after-dinner speaker (John Mason). Fortunately, Ron was soon up and about again, but he seemed to think it a good idea that I continued to take on this duty.

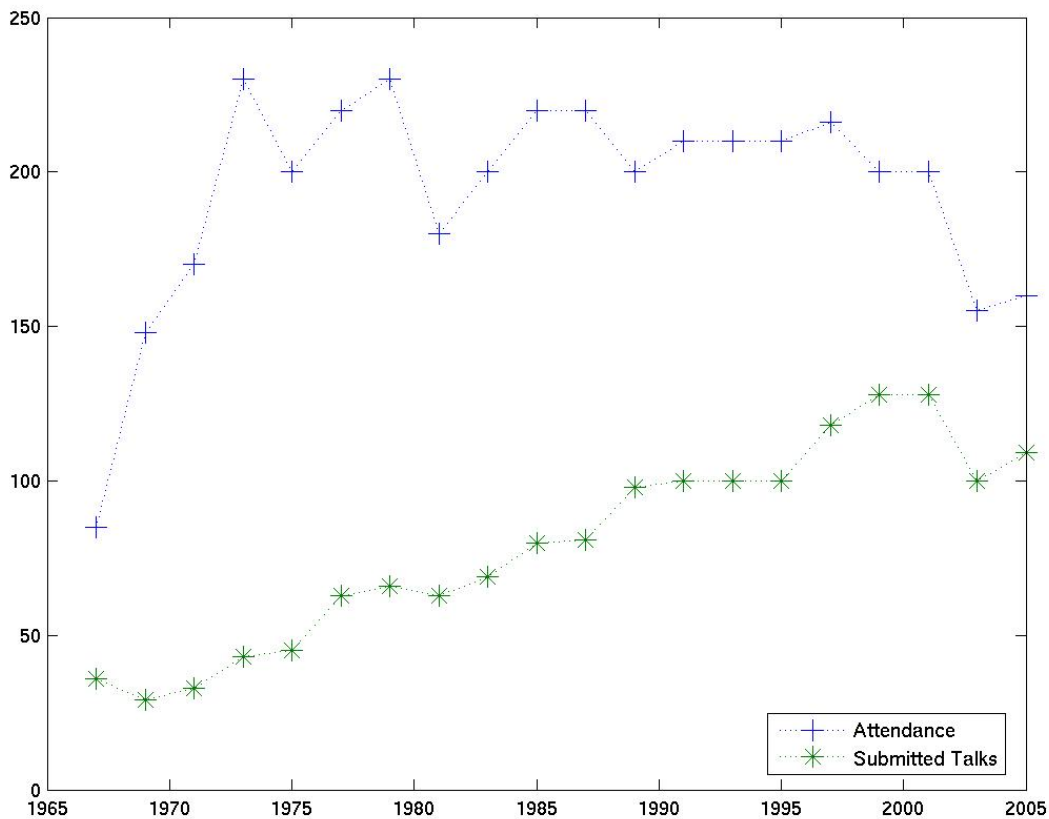
The 1991 Conference celebrated Ron’s 70th birthday. It was agreed to set up a fund (the A R Mitchell Fund) to help support attendance at this and future conferences of deserving (preferably young) numerical analysts, and generous donations came from Gene Golub as well as many others. It was also decided to initiate a special lecture (the A R Mitchell Lecture) to be given at this and at future conferences by an eminent numerical analyst. It was easy to select the first A R Mitchell lecturer, and Gene Golub ably fulfilled the role. Jack Lambert gave the after dinner speech at the Conference dinner, which naturally was peppered with anecdotes about Ron.

The arrangement to publish the Proceedings in the Pitman series continued in a satisfactory way until 1999, although by this time the series had evolved into a Chapman

and Hall/CRC series of Research Notes, published by CRC Press. As a result of further changes being proposed, it was decided to publish the invited papers of the 2001 Conference as a special issue of the journal Applied Numerical Mathematics. In 2003, we decided to become independent and produced our own version of the Proceedings as a Dundee Report, and in 2005, for a variety of reasons, we took the decision not to publish Proceedings. The 2005 meeting included a special lecture sponsored by the IMA, to celebrate 25 years of the IMA Journal of Numerical Analysis. The lecture was given by Bill Morton, and introduced by Mike Powell: they were the founding Editors of the Journal. The meeting was noteworthy in another way, as ill-health meant that Ron Mitchell for the first time ever was unable to participate.

It is interesting to look back at how the attendance and number of submitted talks given has changed over the years, as shown in the accompanying graph. The present generation of numerical analysts of course is spoiled for choice, with a huge range of conferences, many on specialist topics, and many in exotic locations. Dundee has to compete in this marketplace, and we look forward to hosting the 22nd meeting from 26–29 June, 2007.

Acknowledgement I am grateful to the many people who shared their recollections with me, in particular of the 1965 meeting. Errors of fact, to do with that or anything else in this article, are of course my responsibility. This article is dedicated to Ron Mitchell on the occasion of his 85th birthday, June 22, 2006.



Dundee Biennial Conferences