

Celebrating James Hardy Wilkinson

The photograph shows HRH Prince Philip, Duke of Edinburgh presenting an honorary fellowship of the IMA to James Hardy Wilkinson FRS (27 September 1919 – 5 October 1986) in 1977. The Duke was president of the IMA, 1976–1977. At the 100th anniversary of his birth, we'd like to remember Wilkinson and report on some information about him that we've recently been able to make available.

In July 1977 an IMA symposium 'The Contribution of Dr J.H. Wilkinson to Numerical Analysis' was organised to commemorate Wilkinson's honorary fellowship. The proceedings of the meeting were published in a 91-page A5 booklet. It contains four articles, including one by Wilkinson on matrices with nearly repeated eigenvalues and one by Leslie Fox giving anecdotes about Wilkinson as a person. We have scanned the proceedings and, with the permission of the IMA, made it available at nla-group.org/james-hardy-wilkinson, which is a webpage where we are collecting information about Wilkinson.

Wilkinson went to Cambridge when he had just turned seventeen and graduated three years later with a BA in mathematics, with first class honours and a distinction. His studying was curtailed when he was drafted into military scientific work in 1940. At Cambridge Wilkinson's main interest had been classical analysis, but with the Ministry of Supply he got his first taste of numerical analysis. In 1946 he joined the National Physical Laboratory (NPL), mainly to work with Alan Turing on the Automatic Computing Engine (ACE) project. He remained at NPL until his retirement in 1980, having risen to be a Chief Scientific Officer; a very rare special merit position.

It was Wilkinson's early experience of solving systems of linear equations on Hollerith and desk machines, and then solving eigenvalue problems on the Pilot version of ACE, that led him to develop the theory of rounding error analysis, expounded in his 1963 landmark book *Rounding Errors in Algebraic Processes*. Two years later his seminal book *The Algebraic Eigenvalue Problem* was published. In 1971, with Christian Reinsch, he edited an influential book that became known simply as 'The Handbook', with Algol 60 programs for the numerical solution of a variety of linear algebra problems, accompanied by proper documentation including background and applicability, description of parameters, discussion of numerical properties and error bounds, and test results. This was a spur for many subsequent software projects, such as the various PACKS in the USA and NAG; at that time a UK university project.

We still rely today on the foundations that Wilkinson laid for the development and analysis of numerical linear algebra algorithms and software.

Although Wilkinson never had a permanent academic position, he often gave lecture courses and was very encouraging to younger people, as well as to those colleagues who worked for him at NPL, such as Gwen Peters, who had a number of joint publications with Wilkinson. She recently commented that he always saw the best in people, and she shared with us a dedication he had written in her copy of *The Algebraic Eigenvalue Problem*: 'To Gwen, in appreciation of her contribution to the practical realisation of these results'.

Over two days in May this year, together with Françoise Tisseur we organised a conference 'Advances in Numerical Linear Algebra: Celebrating the Centenary of the Birth of James H. Wilkinson' in Manchester. The 60 participants enjoyed hearing reminiscences about Wilkinson from those who knew him, as well as new research results and directions for future research. The first day's talks were filmed and can be viewed at nla-group.org/advances-in-numerical-linear-algebra-2019.



During the conference we were delighted to announce the availability of videos of Wilkinson and Cleve Moler speaking at an Eigensystem Workshop held at Argonne National Laboratory, Illinois, USA, in 1973. These were digitised from video tapes owned by Chris Paige (McGill University, Montreal) and we have put them on the nla-group YouTube channel.

In her conference talk, Margaret Wright (Courant Institute of Mathematical Sciences, New York University) highlighted some of the treasures in notes and exercises that Wilkinson wrote for courses he gave as a visiting professor in the Computer Science Department at Stanford University between 1977 and 1982. The videos and course notes can be accessed via the Wilkinson page mentioned above. They provide an excellent opportunity to see the master at work and to see how his thinking on explaining numerical linear algebra evolved from his 1960s books.

For more on Wilkinson, see [1].

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REFERENCES

- 1 Hammarling, S.J. (2019) James Hardy Wilkinson, 27 September 1919 – 5 October 1986, MIMS EPrint 2019.10, University of Manchester, eprints.maths.manchester.ac.uk/2711.