# Electromagnetic Modelling & Measurements for Analysis & Synthesis Problems

# Electromagnetic Modelling and Measurements for Analysis and Synthesis Problems

edited by

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Dedicated to the memory of
Jozef K. Skwirzynski
and
Yvonne Skwirzynska

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# PREFACE

In this volume is presented the proceedings of a NATO Advanced Study Institute (ASI) on the theme of Electromagnetic Modelling and Measurements for Analysis and Synthesis Problems. The ASI was held at Il Ciocco, Castelvecchio Pascoli, Tuscany, Italy, August 10th - 21st, 1987. It has been my good fortune to act as co-director of two of Jozef's previous ASIs, and so I am well acquainted with the JKS format for ASIs. As participants will realise, I did not attend this ASI, and so I only have a partial appreciation of the programme. In particular it has not been possible to include transcripts of any panel discussions which may have taken place. Readers may recall that such transcripts have formed a most interesting and useful part of previous ASI proceedings edited by Jozef Skwirzynski, and helped to convey the spirit of the meetings. Unfortunately it has proved impossible to locate the tapes, despite the best efforts of Jozef's assistant, Barry Stuart. A further dificulty has arisen through the untimely death of Jozef's former deputy and colleague at GEC Research, Ed Pacello, who assisted Jozef with the organisation of the precursor of this ASI.

The following is taken from original material relating to the aims of the Advanced Study Institute:

"PURPOSE OF THE INSTITUTE

This Institute is concerned with computer modelling and with experimental measurements as two complementary tools for both analysis and synthesis of electromagnetics (EM), infra-red (IR) and optical problems.

ANTENNA ANALYSIS AND SYNTHESIS

Consideration of techniques for measuring EM fields for

reflector antenna diagnosis with shaped and pencil beams. Holograhic techniques will also be reviewed.

SYNTHESIS PROBLEMS

The problem of finding the source distribution over a given locus of points in space which produces a specified response. A more general synthesis problem is one in which the source geometry is unknown, a situation which leads to the true inverse problem. The difficult problems of transient propagation and scattering, and some aspects of pulse propagation, will be considered.

OBJECT OR TARGET SHAPE RECOGNITION

Several methods for obtaining source shapes from inverse scattering data will be considered which facilitate automated target recognition in electromagnetic, infra-red, and optical fields."

Regrettably Jozef became incapacitated before the editing task began, and died before it could be completed. I am indebted to all the participants for their patience, and support in my completing this task and bringing this account to a close. I know that Jozef would wish me to thank his co-directors, and indeed all those who contributed towards the successful outcome of this ASI. In particular, I am sure that Jozef would wish me to publicly thank his old compatriot, friend and bridge partner, Barry Stuart, for all that he did in assisting the administration of this and previous ASI's. I too add my thanks to these, and also wish to thank in particular Barry Stuart, whose patience knows no bounds, Adrian Wright, and Marjorie Sadler. Many people are deserving of my thanks in this venture, and I apologise to any of them whom I have inadvertently not acknowledged herein.

Bernard de Neumann

Chalkwell,
November 1989.

The following poem, by Leo Felsen, was dedicated to the ASI, and Jozef promised that it would be in the final volume.

Another year has passed us by.
Let's give the new one a fair try.

May peace prevail in every place,
Both here on earth and out in space.

May dollars, DM, francs and yen
Find levels that they can maintain

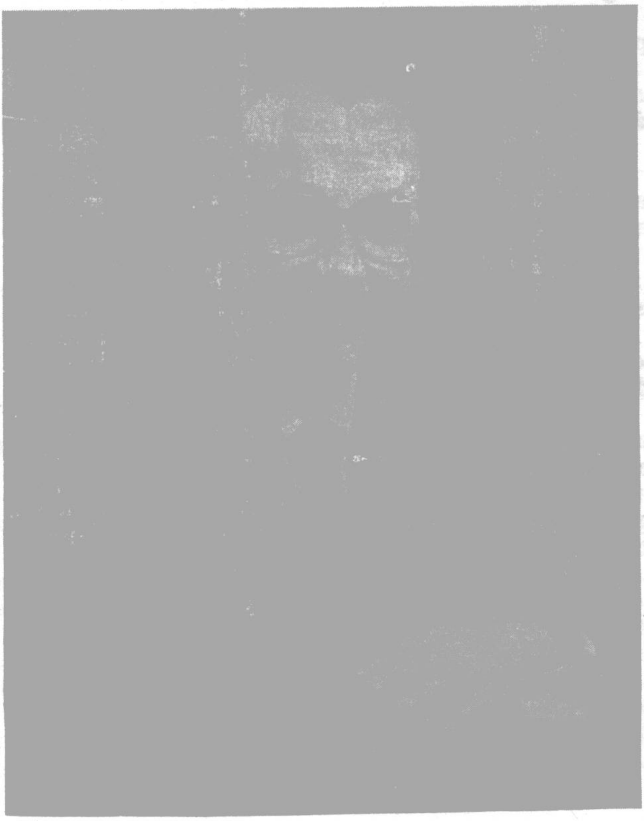
Between extremes of Boom and Bust,
One a niveau that all will trust.

May politics become a game
Where leaders trade respect not blame,

And where the rules by which they play
Would match their deeds with what they say.

While we must hope, let us be wise;
On earth will be no paradise.

Though cautious, let's not be afraid.
Greetings and HAPPY 88!



Jozef K. Skwirzynski, M.B.E.
1921 - 1989

## Jozef Kazimierz Skwirzynski, M.B.E.

Jozef was born in Budzanow, Poland on 21st December 1921. He began his education there, but it was interrupted by the invasions of Poland by both Germany and then the USSR in 1939. He was arrested by the Russians in 1939, and deported to the Ukraine where he spent two years in prison/work camps. He felt that it would be to his advantage to volunteer for skilful tasks whilst being detained, and so, when people with driving skills were called for, he put himself forward. This resulted in his ploughing a lonely furrow in the Ukraine, where he drove a caterpillar tractor towing a plough. Later, in 1941, after Germany invaded the USSR, and after most Russian-held Polish prisoners had been released to form an army in the USSR, which was not armed through fear of insurrection, volunteers were called for who could fly. Naturally Jozef volunteered. This resulted in Jozef being released from the Polish army and his being posted to Britain, via Tehran, Bombay and Cape Town. A somewhat tortuous journey not without incident, which included a night in jail in Cape Town. Upon his arrival in Britain he was sent to Blackpool, Lancashire, where he met his wife-to-be, Yvonne. The cultural shock must have been immense, and the Polish contingent found itself wondering what to do with some of the items which they were presented with upon arrival, such as small jars of Marmite, Cherry Blossom Polish, etc. Jozef had many tales connected with his arrival in the UK, and his friends will, no doubt, recall them with pleasure. It was soon discovered that Jozef had no flying abilities, and so he became, after training, a navigator in the Polish Section of the Royal Air Force. The rapidity of his uptake of the art of aircraft navigation did not go unnoticed, particularly as he had to cope with the disadvantage of learning English simultaneously, and quickly he became a Navigation Instructor to other Poles.

After the war Jozef took a double First in Mathematics and Physics from Imperial College, and afterwards spent two years there as a lecturer. He joined Marconi Research Laboratories, Great Baddow, in 1951. Here he became Chief of the Mathematical Physics and Circuitry Group in 1969, and Manager of Theoretical Support Services in 1977. During his time at Baddow he became an authority on the design of electrical filters, an area which is replete with Poles and poles, and he had a book published on the subject in 1968. He also authored many papers and articles upon theoretical aspects of electronic engineering, many of which were published. At the time of his retirement he was Consultant to Marconi Research Centre.

He represented Marconi and GEC on various national and international bodies, and served on the University Grants Committee mathematics sub-committee for several years. He organised and ran a large number of NATO Advanced Study Institutes - probably more than any other person. In his spare time he, with his wife, until she died, ran a small but widely known antiques business; indeed he was to become an acknowledged expert on oriental antiques.

In the United Kingdom's New Year's Honours List of 1987 he became an additional Member of the Most Excellent Order of the British Empire in recognition of his services. He died 29th October, 1989.

Many people, including myself, have benefited from Jozef's interest, influence and training, and owe much to the opportunities which he gave them. Life was never dull with Jozef around especially with his "Jozefisms" - such as "hunchback" cars! I acknowledge with pride that I worked with him for twenty-three years. He sometimes joked that I would take over his job, and whilst the editing of this volume has been a sad task, I am proud to have been called upon to complete this part of his work.

Bernard de Neumann

Chalkwell,
September 1990.

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# NOTES