

# Reflections on sound

In honour of  
Professor Emeritus Asbjørn Krokstad

Edited by Peter Svensson

Trondheim, June 2008



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## **PREFACE**

This book is the result of a seminar which was held in Trondheim on 19 May 2006 to celebrate the 75-year birthday of professor emeritus Asbjørn Krokstad. At the seminar, Asbjørn, as well as five of his long-time colleagues, gave presentations in two of the many fields that Asbjørn contributed to during his research career: room acoustics and hearing. No proceedings were made at the time of the seminar but due to its popularity, it was decided later to put together this collection of papers from the seminar. Two additional papers are included, one by Asbjørn Krokstad and one by Peter Svensson. Even with this coverage of two quite distinct areas of research in acoustics, Asbjørns broad scope has not been represented fully: his work on electroacoustic reverberation enhancement, the construction of the earliest digital hearing aids, active noise control systems as well as other topics, are mentioned but could easily have deserved papers on their own.

The contributions from the authors are greatly acknowledged ...

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Peter Svensson, editor

Trondheim, June 2008

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## THE AUTHORS



### **Asbjørn Krokstad**

Asbjørn Krokstad was born in 1931. He finished his M.Sc. in 1956 and his Dr. Ing. in 1964, both at the Norwegian Institute of Technology (NTH), Trondheim. He was the founder of, and Director of research for, the acoustics laboratory at SINTEF/NTH 1964-1968. After a two-year period at Tandberg Radio, he became professor in telecommunications and acoustics at NTH in 1970, and professor emeritus from 1998. In 1984-1985, he spent a sabbatical year at the Royal Institute of Technology (KTH), Stockholm.

He has been a member of national groups, as well as several ad hoc working groups, for standardization in ISO and IEC. He served as scientific advisor to the Ministry of Environment for the formulation of “Noise Abatement Policy” (*St meld 50*), and to the ad hoc group for the Ministry of Work, formulating the Norwegian regulations for noise

in work environments. He was also scientific advisor to the Norwegian delegation to OECD, “Taskforce on Noise Abatement”, and to the Norwegian Governmental Commission on Aircraft Noise 1972-1992. He led the research program “Noise Abatement in Work environments 1973-78” sponsored by the Research Council of Science and Technology (NTNF).

He has written several textbooks in Norwegian on acoustics as well as a book on conducting orchestras and choirs. He has produced 11 journal papers, many international conference publications, numerous open and classified reports, and holds 4 patents in the field of electroacoustics,

Asbjørn Krokstad was the chairman of the Scientific Committee for the 15th International Congress on Acoustics in Trondheim in 1995. He also served as president of the Acoustical Society of Norway 1994-98, and was a member of The International Commission on Acoustics, 1994-1999. In 2002, he was awarded an ASA Fellowship.

In parallel with his academic work, he did many professional consultancy projects as described in the paper by his long-time colleague, Svein Strøm. Asbjørn has been a conductor of several professional and amateur orchestras and bands from 1958 and on.

### **Jürgen Meyer**

Jürgen Meyer was born in 1933 in Braunschweig, Germany. He studied electrical engineering at Braunschweig Technical University, and received a doctor’s degree in 1960 with a thesis on the physics of organ pipes. From 1957 to 1996 he joined the acoustics department of the Physikalisch-Technische Bundesanstalt (PTB) working in the fields of acoustics of musical instruments, room acoustics, and psychoacoustics having international contacts, for example, with the NTNU and Asbjørn Krokstad. Furthermore, he was professor at the Music Academy in Detmold, Germany, teaching acoustics for Tonmeister from 1968 to 2004.

He has written several books and about 150 papers in journals and congress reports, the main books being: *Acoustics and the performance of music*, 2008, and *Kirchenakustik*, 2003. His speciality was the demonstration of the interaction between music and acoustics by commentating and conducting orchestral performances such as the plenary lecture in the Olavshallen at the ICA Congress in Trondheim 1995 (see Fig. 5 in the paper) and the ASA-EAA-Meeting in Berlin 1999 (see Fig. 7, from the rehearsal).

He plays the violin and lead a chamber orchestra, 1991 conducting the first performance of the “Divertimento für Streich-orchester” Op. 105 by Giselher Klebe, which was dedicated to him by the composer.

### **Johan Sundberg**

Johan Sundberg was born in 1936. He completed a Ph.D. in musicology, and received a doctor h.c. from the University of York, UK, in 1996. Johan Sundberg was professor of music acoustics at the Royal Institute Technology (KTH) in Stockholm 1979 - 2001, where he founded and headed its music acoustics research group, which profited from the privilege of hosting several prominent foreign guest researchers such as Asbjørn Krokstad. He has done research particularly on the singing voice and music performance. Johan Sundberg has written the books *The Science of the Singing Voice* (1987, German translation 1997, Japanese translation 2007) and *The Science of Musical Sounds* (1991), as well as edited or co-edited several proceedings of music acoustic meetings. He has practical experience of performing music (choir and solo singing). He is a member of the Royal Swedish Academy of Music, the Swedish Acoustical Society (where he was president 1976-81), and is a fellow of the Acoustical Society of America, from which he received its Silver Medal in Musical Acoustics 2003.

### **Gerald Fleischer**

Gerald Fleischer was born in 1943. He studied at the universities of Kiel, Vienna (Austria) and Tübingen, focusing on various aspects of biological technology, and, as a hobby, on oceanography and geology. He received his doctorate - Dr. rer. nat. - in 1970, for a study on the mammalian hearing organ. After a brief stint at Ruhr-University of Bochum he worked at the University of Miami for three years, with special emphasis on hearing organs in dolphins and whales, and developed methods to determine the hearing capability in extinct mammals, based on cochlear structure. Back in Germany he worked for a federal research center on pale-ecology at the university of Tübingen, for two years, before switching to the newly founded Federal Environmental Protection Agency (UBA) in Berlin, in charge of the effects of noise and vibration. Since 1980 he has been a

professor at the Medical School of Justus-Liebig-University in Giessen.

He met Asbjørn Krokstad for the first time in 2002, at the annual meeting of the Acoustical Society of America, in Pittsburgh, where both contributed to the symposium with presentations. After that he has had many thorough discussions with Asbjørn Krokstad on sound and hearing on various occasions.

### **Svein Strøm**

Svein Strøm finished a Cand.real from Blindern University in Oslo 1967. He worked for 27 years at SINTEF in Trondheim as a research scientist, mainly with room acoustical projects. In all these years he worked together with prof. em. Asbjørn Krokstad on research projects but mainly with planning good acoustics in concert halls and multi-purpose halls in culture venues. For more than 20 years, from 1970 and on, they were consultants for most of the new culture venues built in Norway. Both the *Grieg Memorial Hall* in Bergen and *Olavshallen* in Trondheim were successfully planned by them. They were the first researchers to develop a sound ray tracing program to be used for such planning. Together they published these projects in *Applied Acoustics* and in the *Journal of Sound and Vibration*. Since 1994 Svein Strøm has been an acoustical consultant in IGP / ICG / COWI in Trondheim.

### **Peter Svensson**

Peter Svensson was born in 1964. He completed an M.Sc. in engineering physics at Chalmers University of Technology, Gothenburg, in 1987, and a Ph.D., also at Chalmers, in 1994, with Prof. Mendel Kleiner as supervisor. The thesis topic was electroacoustical reverberation enhancement systems for auditoria and it was at his defence of the Licentiate degree (part of the Ph.D. degree in Sweden) that he first met Asbjørn Krokstad who was the opponent for the defence. After that they had contact during a one-year visit to Chalmers by Johan Nielsen, one of Asbjørns Ph.D. students. Peter Svensson worked with Mendel Kleiner and Ph.D. student colleague Bengt-Inge Dalenbäck (developer of the CATT Acoustics software) on the auralization technique, and has continued to focus on computer simulation techniques in room acoustics, 3D audio techniques for

loudspeaker reproduction, techniques and applications for audio transmission over computer networks, and the perception of audio signals. After the Ph.D. studies, he spent post-doc periods at the University of Waterloo, Canada, and Kobe University, Japan. He has been professor in electroacoustics at NTNU since 1999, trying, in vain, to follow in the big footsteps of Asbjørn Krokstad.

Peter Svensson has published 21 journal papers and more than 80 conference papers. He has been a board member of the Acoustical Societies of Sweden and Norway, and president of the latter 2004-2006. He is currently a member of the board of the European Acoustics Association and serves as associate editor for *Acta Acustica* united with *Acustica*.

