Martijn Vercammen
Michael Vorländer

Congress Report NAG/DAGA 2009

23. - 26. March 2009 in Rotterdam

The Dutch Acoustical Society, NAG, and the German Acoustical Society, DEGA, joined in organizing the conference NAG/DAGA 2009. Both societies observe a growing interest in acoustics due to increase of the demand of experts and expertise in acoustics and vibration control in industry and consulting. Every building, concert hall, classroom, transportation vehicle, every household appliance and every road or railway track is not considered “complete”, if its acoustics is not properly designed. Science, research, education and applications in the field of acoustics must be extended to meet the challenges of the future.

NAG/DAGA 2009 continued the tradition of the biggest scientific annual meeting on acoustics in Europe. It was supported by ABAV, the Acoustical Society of Belgium, by the European Acoustics Association, EAA, and by the German associations of engineers and physicists, ITG, VDI and DPG. 940 colleagues from 31 countries, including 211 students attended the event and discussed 560 oral presentations and posters. 39 exhibitors informed about new developments and showed their new products. Furthermore, several committee meetings and assemblies of NAG and DEGA were held. The congress programme was completed by social events and technical tours for participants and accompanying persons. Conference chairs were Martijn Vercammen (Mook) and Michael Vorländer (Aachen), main responsible for managing the scientific abstracts and papers was Rinus Boone (Delft).

The conference was opened by a unique Jazz performance of the spontaneously founded NAG/DAGA Big Band. In his welcome address, Joachim Scheuren, president of DEGA, explained the definition of acoustics in German and Dutch, and he gave a charming and entertaining demonstration of linguistic transitions of acoustic vocabulary between those two languages. The president of NAG, Bert Roozen, welcomed the congress participants in the Netherlands, and the alderman of the city of Rotterdam, Marc Harbers, gave an interesting insight into political discussion and implementation of noise control in urban and industrial environments with emphasis on the harbor of Rotterdam.

In the opening ceremony the DEGA awards were presented. The Helmholtz medal for outstanding lifetime achievements was given to Prof. Peter Költzsch (Dresden) for "his outstanding and wide-spread contributions to flow acoustics, particularly for computation and modeling of sources and of source-related noise reduction".

From left: Jan Delfs, Peter Költzsch, Joachim Scheuren

The 2009 Lothar-Cremer Award for the best young researcher was presented to Dr. Volker Wittstock for excellent contributions to acoustic metrology and in particular to investigations of measurement uncertainty in applied acoustics.

From left: Werner Scholl, Volker Wittstock, Joachim Scheuren

NAG awarded Tjeert Ten Wolde (left) an honorary membership in the Dutch Acoustical Society. The award was given by NAG president Bert Roozen at the occasion of the NAG General Assembly.

The scientific programme committee organized 34 structured sessions in all fields of acoustics. Contributed sessions were added, and thus the programme included some 530 oral presentations. After all, starting from 8:40 in the morning until 18:00 in the evening, the presentations in 12 parallel sessions reached the limit of feasibility in the typical "DAGA format" of 2.5 days duration. The plenary lectures (see below) were particularly attractive, so that the capacity of the main lecture hall was almost completely reached.

On behalf of the conference organization we would like to thank all participants for attending and for contributing to the event. The pleasure of having organized this joint event was on our side. It seems that the experience of the conference as a whole, the communication about scientific and technical progress was highly appreciated. Also, we had the impression that the relaxed atmosphere in the conference center De Doelen and the comfortable spaces available for foyer discussions contributed to the success, to continued cooperation in future and to friendship among colleagues. Finally, our thanks go to the team of DAGA 2010 in Berlin for sponsoring the champagne of the farewell event.

M. Vercammen, M. Vorländer
(April 2009)

Plenary Lectures

Tammo Houtgast, VU University Medical Center, Amsterdam

The acoustical engineer as a researcher in speech and hearing

There is a long tradition of acoustical engineers working in the field of speech and hearing. Although it is well recognized that speech reception, and hearing in general, involves cognitive processes beyond the reach of the engineer, this engineering approach has led to interesting results which will be reviewed briefly. For the engineer, speech is often described in acoustical terms as a succession of sounds with specific properties in terms of spectra and decibels. It has been possible to identify the acoustical cues in a speech signal which are essential for speech intelligibility. These cues are related to the dynamics, or the pattern of fluctuations, in the speech signal. By applying a specific type of speech analysis, the strength of these cues in an ongoing speech signal can be quantified. It will be shown that the effect of speech transmission and room acoustics on speech intelligibility can be estimated successfully by measuring the degree of preservation of these cues in the speech signal received by the listener. In the field of hearing, the engineer is concerned mainly with the quality of the peripheral auditory system (i.e., the cochlea) in terms of accurate coding of the incoming sound. Sub-optimal performance (hearing impairment) may be related not only to a raised hearing threshold (hearing loss as determined by the classical tone audiogram), but also to a reduced quality of the coding process in terms of spectral and temporal resolution. The specific part of psycho-acoustical research concerned with this topic will be briefly reviewed: the design of appropriate test signals and measuring procedures to estimate the acuity in the auditory coding of the spectral, temporal and amplitude sound characteristics.

Michael Barron, University of Bath

Then and now - how concert hall design of the 1960s/'70s compares with the present

The 1960s and '70s were an exciting time for concert hall design. Several important new halls were built to replace war damage, but arts provision also needed improving in many cities round the world. Concert hall design was in an experimental phase with some major successes and disappointments; the Philharmonic halls in Berlin (1963) and New York (1962) illustrate the 'extremes'. The De Doelen large hall of 1966 is rated as an acoustic success but is interesting as an example of a particular design philosophy: a large hall with highly scattering walls and ceiling. This approach has not been followed much elsewhere. Current approaches to concert hall design are different in many ways to those of around 40 years ago. The tools available now include much better understanding of the important dimensions for concert hall listening, objective quantities corresponding to these subjective dimensions, modelling by scale or computer simulation modelling. Some designers also use auralisation. But as well as technical developments, the role of the acoustician is now generally more prominent in the design team. With greater responsibility, current designers often take fewer risks and adhere to one of two precedents: the parallel-sided hall and the vineyard terrace hall. The paper will concentrate on the comparison between 40 years ago and the present, mainly in terms of acoustics for the listener but also with a short mention of conditions for the performers.

Tjeert ten Wolde, Leidschendam

Reciprocity measurements in acoustical and mechano-acoustical systems. Review of theory and applications

Dynamical systems are called reciprocal when the transmission of vibration from point A to point B has a simple relation with the transmission from point B to point A. The theory on this issue will be reviewed and the boundaries of the validity of reciprocity for acoustical, mechanical and electrical systems, and for combinations of these, will be discussed. When a system is reciprocal, there is an alternative possibility for the measurement of transfer functions and for the determination of source strength (acoustical, mechanical or electrical). The latter application concerns a reciprocal version of the substitution method. Reciprocal measurements can be attractive when the direct measurement offers problems, for example when there is too little space for a sufficiently strong auxiliary source in the direct set-up. Examples of such cases will be presented for acoustical and mechano-acoustical systems. The general reciprocity theorem is known since 1873 (Lord Rayleigh). It lasted nearly a century before the first article on the above applications was published (1970, Steenhoek and Ten Wolde). Since than, the methods have been developed continuously and at present they are widely used as tools in the development of quiet cars, trucks, ships, trains, aircraft and buildings.

Volker Wittstock, Physikalisch-Technische Bundesanstalt, Braunschweig

Uncertainties in Applied Acoustics – Determination and Handling

Starting point for an uncertainty determination according to the “Guide to the expression of uncertainty in measurement” (GUM) is a mathematical model which is derived from the definition of the measurand. The model is used to calculate the combined uncertainty of the measurand based on the uncertainties of the input quantities. In applied acoustics, an application of this method seems to be possible for field quantities like sound pressures or structure-borne accelerations which can be measured directly. The determination of integral quantities, such as sound powers or sound insulations mostly requires special sound fields which can be realised only approximately in practice. In these cases, complete models are very difficult to establish. Therefore, round robin tests are used to determine the uncertainty of measurands which are implicitly defined by a procedure. The standard deviation of reproducibility calculated from round robin results serves as the estimate for the combined uncertainty of all the measurands determined in accordance with the prescribed procedure. This contribution gives an overview of the different possibilities to determine uncertainties in applied acoustics. Examples are given and correlation effects for the determination of A-levels or rated values in building acoustics are discussed. Finally, proposals for the handling of uncertainties are made.

Torsten Dau, Centre for Applied Hearing Research, TU of Denmark

Recent concepts and challenges in hearing research

In everyday life, the speech we listen to is often mixed with many other sound sources as well as reverberation. In such a situation, normalhearing listeners are able to effortlessly segregate a single voice out of the background, which is commonly known as the ”cocktail party effect”. Conversely, hearing-impaired people have great difficulty understanding speech when more than one person is talking, even when reduced audibility has been fully compensated for by a hearing aid. As with the hearing impaired, the performance of automatic speech recognition systems deteriorates dramatically with additional sound sources. The reasons for these difficulties are not well understood. Only by obtaining a clearer understanding of the auditory system’s coding strategies will it be possible to design intelligent compensation algorithms for the hearing impaired. This presentation highlights recent concepts of the signal processing strategies employed by the normal as well as impaired auditory system. The aim is to develop a computational auditory signal-processing model, capable of describing the transformation from the acoustical input signal into its ”internal (neural) representations”. Several stages of processing are considered to be important for a robust signal representation and a deficiency in any of these processing stages is likely to result in a deterioration of the entire system’s performance. A state-of-the-art model of auditory signal processing would be of major practical significance for technical applications, in digital hearing aids, cochlear implants, speech and audio coding, and automatic speech recognition.

Pre-colloquia on Monday, March 23

Noise and ports: impacts on cities, humans and techniques

The precolloquium Noise and ports: impacts on cities, humans and techniques illustrated the many facets of port activities, the noise effects and impacts on its surrounding areas. International experts presented interesting topics and new insights regarding noise control, noise management and the noise/spatial planning dilemma. Experiences from several European ports led to lively and constructive discussions; and intentions on continuing information exchange throughout Europe have been expressed.

Miriam Weber

Array Technology in Audio and Acoustics, Delft University of Technology

A successful precolloquium was held at Delft University of Technology. About 100 participants attended a nine-part lecture program in which the broad research program of the "Laboratory of Acoustical Imaging and Sound Control" was presented. The fields of interest range from room acoustics via medical diagnostics and non-destructive testing to seismic exploration. During the lunch break, the laboratory facilities were shown and demonstrations were given of Wave Field Synthesis, hearing glasses and the variable acoustics system ACS.

Diemer de Vries