



Australian Acoustical Society

A.C.N. 000 712 658

VICTORIA DIVISION

c/- N Broner, SKM, 452 Flinders Street, Melbourne VIC 3000

NOTICE OF EVENT



Federation Square, 7000 square meters, Barrisol Lumiere translucent

Properties and applications of micro-perforated materials

The Victorian division of the Australian Acoustical Society and Barrisol are pleased to invite you to a technical seminar on micro-perforated materials.

Date: Monday 7 November 2011
Time: 6:00pm for 6:30 start
Venue: SKM Office, 452 Flinders St, Melbourne (nearly opposite the aquarium)
RSVP: Monday 2th November 2011 to vic-secretary@acoustics.asn.au

NOTE: Due to card access only, we will collect attendees from the Foyer every 10 minutes from 6.00 PM to 6.40 PM.

Victoria Division of the Australian Acoustical Society

Properties and applications of micro-perforated materials

Dr. Christian Nocke
Akustikbüro Oldenburg, Oldenburg, Germany
www.akustikbuero-oldenburg.de

Disclosures
Barrisol

The theory background of micro-perforated sound-absorbing panels was first described by D.-Y. Maa in 1975. Since Maa's seminal contribution, many variations of micro-perforated sound absorbing materials have been introduced. Micro-perforations have been applied to metal, wood, plastics and many other materials. In 2001, a nearly invisible micro-perforation was applied to stretched membrane material, yielding high sound absorption performance, while not being an overtly obvious sound absorbing material. Stretch membranes are custom manufactured to any panel size, offering an acoustic solution for rooms not restricted by fixed prefabricated panel sizes. In his presentation, Dr. Nocke will outline the theoretical background of micro-perforated materials and the application of these to stretch membrane materials. He will also detail the sound absorption coefficient results of various laboratory based tests with micro-perforated stretch membranes he has conducted (with & without additional acoustic materials) and finally present some examples of room acoustics before and after the installation of micro-perforated ceiling and wall membranes.

Dr. Christian Nocke

born: November 16, 1967 in Osnabrück, Germany



- 1990 to 1995** study of physics at Philipps-University Marburg and Carl von Ossietzky University Oldenburg; degree: Diplom
- 1996 to 1999** PhD scholarship from Federal Government (Studienstiftung des deutschen Volkes) supported by Prof. Volker Mellert and scientific staff at Fraunhofer-Institut for Building Physics (Department of room acoustics / technical acoustics, Stuttgart)
- Summer 1999** three month research visit to Institute of Acoustics in Beijing (PR China) visiting Prof. D.-Y. Maa; work about micro-perforated sound absorbers.
- March 2000** PhD (Dr. rer. nat.), defense in March 2000 – topic: *In-situ Messung der akustischen (Wand-)Impedanz (In-situ measurement of the acoustical (wall-)impedance)*, scientific staff at Oldenburg University, Dep. of Physics until end of 2000.
- 2000 to 2002** lecturer for physics at Fachhochschule
- 2001** Oldenburg/Ostfriesland/Wilhelmshaven, departement of nautics founding of *Akustikbüro Oldenburg* (acoustical consultancy)
- 2001 to 2004** head of office of German Acoustical Society (Deutsche Gesellschaft für Akustik DEGA e.V.) in Oldenburg; during this time organisation of three annual meetings (Bochum, Aachen, Straßburg joint with SFA)
- Since July 2002** from Oldenburg chamber of commerce publically announced and certified expert for noise immissions, building and room acoustics (von der Oldenburgischen IHK öfenntlich bestellter und vereidigter Sachverständiger für Lärmimmission, Bau- und Raumakustik)
- 2004** founding of *Höfker Nocke Bückle Partnerschaft – Physiker und Ingenieure* (partnership company) with offices in Bochum, Oldenburg and Stuttgart, see www.hnb-bauphysik.de
- 2004-2006** lecturer for building physics (building and room acoustics) at Fachhochschule Oldenburg/Ostfriesland/Wilhelmshaven, department of architecture
- 2008-2011** lecturer for acoustics (sound propagation outddoors) at Hochschule Bochum, department of mechanical engineering
- Publications:** see list „Veröffentlichungen“ at www.akustikbuero-oldenburg.de
- Memberships:** ASA - Acoustical Society of America,
NCAC - National Council of Acoustical Consultants,
VBD - Verband der Bausachverständigen Deutschlands e.V.

Dr. Christian Nocke, presentations and publications

2011

C. Nocke, C. Hilge, J.-M. Scherrer, Micro-perforated sound absorbers in stretched materials, accepted for Acoustics 2011 - Breaking New Ground - The 2011 Conference of the Australian Acoustical Society

C. Nocke, Absorption und Nachhallzeit. dds das Magazin für Möbel und Ausbau 6/2011, Seite 74

C. Nocke, DIN 18041 Klassenraumakustik - Neuland oder nur vergessen?. AIT 5/2011. Seite 136

C. Nocke, Alpha was nochmal?. dds das Magazin für Möbel und Ausbau 5/2011, Seite 46

C. Nocke, Grundlagen der Akustik. dds das Magazin für Möbel und Ausbau 4/2011, Seite 24

2010

S. Diver, C. Nocke, G. Höfker, Sprachverständlichkeitsminderung durch Schallschirme in Mehrpersonenbüros, DAGA 2010, S. 945

C. Nocke, C. Hilge, J.-M. Scherrer, Micro-perforated stretched foils as sound absorbers and barriers. ASA Meeting Baltimore (canceled due to dust ...)

C. Nocke, The true absorption - Measurements and coefficients. ASA Meeting Baltimore (canceled due to dust ...)

A. Schick, M. Meis, C. Nocke, Beiträge zur psychologischen Akustik - Dokumentation des 1. Symposiums Büro. Raum. Akustik. Köln
Akustik in Büro und Objekt, Isensee-Verlag 2010

2009

C. Nocke, Buchrezension Bauphysik-Kalender 2009 - Schallschutz und Akustik, S. 8/9, VBDInfo, 3/2009

2008

[BSO Fachschrift Raumakustik](#)

2007

C. Nocke, C. Hilge, J.-M. Scherrer, Micro-perforated and porous materials as sound absorbers, Proc. Noise at Work conference, Lille

C. Nocke, C. Hilge, J.-M. Scherrer, Acoustic absorbers made of micro-perforated stretched ceilings and other materials, J. Acoust. Soc. Am. 121, 3032

C. Nocke, Short review on in situ measurement techniques of impedance or absorption, J. Acoust. Soc. Am. 121, 3029

2006

C. Nocke , Memorandum zum Thema: Allgemein anerkannte Regeln der Technik und DIN 4109, S.17, VBDInfo, 4/2005

C. Nocke, C. Hilge, Measurements and calculations on microperforated sound absorbers, J. Acoust. Soc. Am. 119, 3249

2005

C. Nocke, C. Hilge, J.-M. Scherrer , Micro-perforated stretched ceilings and porous materials, Forum Acusticum 2005, Budapest (Hungary), 2005

C. Nocke, J.-M. Scherrer, C. Hilge, Layered sound absorbers made of micro-perforated foils, porous an other materials, Internoise 2005, Rio de Janeiro (Brasil), 2005

C. Nocke, C. Hilge, J.-M. Scherrer , Sound absorbers with micro-perforated stretched foils and porous materials, ASA-Meeting, Vancouver (Canada), J. Acoust. Soc. Am., Vol. 117, No. 4, p. 2556, 2005

C. Nocke, C. Hilge, M. Meis, Auralization studies to develop a classroom questionnaire, J. Acoust. Soc. Am. 117, 2404

C. Nocke, C. Hilge, J.-M. Scherrer , Micro-perforated stretched foils and porous materials - basics and applications, NOVEM 2005, St. Raphael (France), 2005

C. Nocke, C. Hilge, J.-M. Scherrer , Mikroperforierte Absorber aus gespannten Folien, DAGA 2005, München, S. 721/722 2005

M. Meis, B. Becker, S. Hofmann und C. Nocke, Wie bewerten Schüler ihre Lernumgebung? Ergebnisse eines Feldexperimentes zur Sanierung von Klassenräumen aus einer ganzheitlichen Perspektive, DAGA 2005, München, S. 439/440, 2005

M. Meis, C. Hilge, C. Nocke et al., Subjektive Einschätzung der Sprechstimme und der Hörumgebung in universitären Seminarräumen, DAGA 2005, München, S. 441/442, 2005

2004

C. Nocke, C. Hilge, M. Meis, Raumakustik in Klassenzimmern, Tagungsband, 18. Bauphysikertreffen, HfT Stuttgart, S. 91, 2004

C. Nocke, C. Hilge, Micro-perforated stretched ceilings - basics and applications, ASA-Meeting, New York, 2004

M. Klatte, M. Meis, C. Nocke, A. Schick, Lernumwelt = Lärmumwelt?!, Zeitschrift Grundschule, 36. Jahrgang, Heft 2, Westermann, Februar 2004

C. Nocke, C. Hilge, Application of micro-perforated stretched ceilings, to be published, CFA/DAGA'04, Strassburg, 2004

C. Nocke, V. Mellert, Applications of in-situ measurement techniques of absorption. to be published, ICA, Kyoto, 2004

2003

C. Nocke, Neue baurechtliche Regelungen könnte den Lärmpegel senken, Erziehung und Wissenschaft, Allgemeine deutsche Lehrerzeitschrift, 55. Jahrgang, GEW, 2003

C. Hilge, C. Nocke, Properties and application of micro-perforated stretched ceilings, Research Symposium 2003, Acoustics characteristics of surfaces: measurement, predictions and applications, Proc. Institute of Acoustics, Vol. 25, Pt. 5, 2003

C. Nocke, V. Mellert, Applications of in-situ measurement techniques of absorption, Research Symposium 2003, Acoustics characteristics of surfaces: measurement, predictions and applications, Proc. Institute of Acoustics, Vol. 25, Pt. 5, 2003

M. Klatte, M. Meis, C. Nocke, A. Schick, Tagungsband zum 9. Oldenburger Symposium zur Psychologischen Akustik, BIS Verlag Universität Oldenburg (2. Auflage neu erschienen !)

C. Nocke, D. Heydinger, M. Meis, A. Schick, Auralisierung und subjektive Bewertung von Klassenräumen, Fortschritte der Akustik DAGA`03, Aachen , DEGA e.V., Oldenburg, S. 628-629, 2003.

M. Meis, A. Uygun, C. Janott, C. Hemmer-Schanze, C. Hilge, J. Kahlert, A. Schick, Zur Wirkung von aktiven und passiven raumakustischen Maßnahmen auf die Geräuschwahrnehmung und Lebensqualität von Schülern: Ergebnisse aus einer prospektiven Längsschnittstudie, Fortschritte der Akustik DAGA`03, Aachen , DEGA e.V., Oldenburg, S. 630-631, 2003.

2002

C. Hilge, C. Nocke, Spannungsreiche Messe, Trockenbau Akustik, H. 1 / 2002, S. 21-22, 2002

M. Klatte, M. Meis, C. Nocke, A. Schick, [Akustik in Schulen: Könnt ihr denn nicht zuhören?!](#), Einblicke – Forschungsmagazin der Carl von Ossietzky Universität Oldenburg, H. Nr. 35, S. 4-8, Frühjahr 2002

M. Meis, A. Schick, M. Klatte, C. Nocke, Ruhiger lernen, Trockenbau Akustik, H. 9 / 2002, S. 34-40, 2002

C. Nocke, C. Hilge, Akustische Raumgestaltung – Teil 1: Verbesserung der Raumakustik, Raumausstatter Zeitschrift, H. 6/7, S. 64-66, 2002

C. Nocke, V. Mellert, Brief review on in-situ measurement techniques of impedance or absorption, Forum Acusticum, Sevilla, Tagungsband als CD-ROM

2001

C. Nocke, V. Mellert, Bestimmung der Feldimpedanz aus der direkten Messung von Schallschnelle und -druck im Freifeld, DAGA 2001, DEGA - Oldenburg

C. Nocke, V. Mellert, Application of a free-field transfer function method to measure the acoustic impedance, ICA 2001, Rom, CD-ROM

2000

C. Nocke: In-situ acoustic impedance measurement using a free-field transfer function method, *Applied Acoustics* 59(3), p. 253-264, 2000

C. Nocke, In-situ Messung der akustischen (Wand-)Impedanz, Dissertation Universität Oldenburg, Shaker-Verlag, Aachen, 2000

C. Nocke, K. Liu, D.-Y. Maa, Statistical absorption coefficient of microperforated absorbers, *Chinese Journal of Acoustics* 19 (2), p. 97-104, 2000

K. Liu, C. Nocke, D.-Y. Maa, Experimental investigation on sound absorption characteristics of microperforated panel in diffuse field, *Acta Acustica* 25 (3), p. 211-218, 2000 (in Chinesisch)

X. Zha, H. Drotleff, C. Nocke: Raumakustische Verbesserungen im Probensaal der Staatstheater Stuttgart, *Bauphysik* 22, H. 4, S. 232-239, 2000

1999

H. V. Fuchs, X. Zha, C. Nocke: Erprobt und ausgezeichnet: mikroperforierte Folien-Absorber. *Bauphysik* 21, H. 1, S. 34-38, 1999

X. Zha, H. V. Fuchs, C. Nocke, X. Han: Measurement of an effective absorption coefficient below 100 Hz. *Acoustics Bulletin* Jan/Feb 99, p. 5-10, 1999

C. Nocke: Measurement of the effective surface impedance in laboratory and in-situ, In: Proc. DAGA/EAA/ASA Meeting 99, Oldenburg: DEGA e.V. (Hrsg.), 1999

C. Nocke: Measurement of the effective surface impedance in laboratory and in-situ, In: Proc. of 8th national congress of sound and vibration engineering", pp. I9-I19, Qingdao, VR China, 1999

C. Nocke: Improved impedance deduction from measurements near grazing incidence, *Acustica/acta acustica* 85 (4), p. 586-590, 1999

1998

H. V. Fuchs, X. Zha, C. Nocke, H. Wenski, U. Mauritz: Stille Wellen. *Trockenbau Akustik* 15, H. 6, S. 23-24, 1998

X. Zha, H. V. Fuchs; C. Nocke; D. Mao, G. Babuke: Microperforated Absorbers for Noise Control in Enclosures. *Euro Noise 98: Proceedings*. Oldenburg: DEGA, S. 699-704, 1998

M. Späh, X. Zha, C. Nocke, G. Jiang: Measurement of Effective Absorption at Low Frequencies. *Euro Noise 98: Proceedings*. Oldenburg: DEGA, S. 781-786, 1998

C. Nocke, H.V. Fuchs, V. Mellert: Acoustic Impedance Determination of Large Absorbent Linings. *Euro Noise 98: Proceedings*. Oldenburg: DEGA, S. 853-858, 1998

C. Nocke, F. V. Fuchs: Bestimmung der Wandimpedanz aus Messungen der Übertragungsfunktion. In: *Fortschritte der Akustik - DAGA 98*, Oldenburg: DEGA e.V. (Hrsg.), S. 152-153, 1998

M. Späh, X. Zha, C. Nocke, G. Jiang: Messungen an Schallabsorbern bei tiefen Frequenzen. In: *Fortschritte der Akustik - DAGA 98*, Oldenburg: DEGA e.V. (Hrsg.) S. 154-155, 1998

X. Zha, C. Nocke, C. Häusler, H. Wenski: Lösung raumakustischer Probleme mit mikroperforierten transparenten Bauteilen. Bauphysik 20, H. 6, S. 198-208, 1998

H.V. Fuchs, X. Zha, C. Nocke, H.Wenski:Lärminderung in einem Freizeitbad, IBP-Mitteilung 25 (1998), Nr. 329

1997

C. Nocke, V. Mellert, T. Waters-Fuller, K. Attenborough, K. M. Li: Impedance deduction from broad-band, point-source measurements at grazing incidence, Acustica/acta acustica 83 (6), p. 1085-1090, 1997

X. Zha, M. Späh, C. Nocke, G. Jiang: Neuer Laborraum für Untersuchungen an Schallabsorbern bei tiefen Frequenzen. IBP-Mitteilungen 24 , Nr. 317, 1997

1996

C. Nocke, V. Mellert: Bestimmung der Impedanz aus Messungen bei streifendem Schalleinfall, In: Fortschritte der Akustik - DAGA 96, DEGA, Oldenburg, 1996

C. Nocke, V. Mellert: Experimental deduction of surface impedance In: Proc. Forum Acusticum 96, pp. 140, 1996

1995

V. Mellert, C. Nocke, S. Teuber, S. Krautwald: Determination of the surface impedance from measured spherical wave reflection coefficients, In: Proc. of ICA 95, p. 569 - 572, 1995

V. Mellert, C. Nocke, S. Teuber: Surface impedance measurement with spherical wave reflection coefficient for inhomogeneous samples, In: Proceedings Internoise 95, pp. 1083 - 1087, 1995

C. Nocke, V. Mellert, S. Teuber: Experimentelle Bestimmung beliebiger Oberflächenimpedanz mit Hilfe des Kugelwellenreflexionsfakors, In: Fortschritte der Akustik DAGA 95, p. 623-636, 1995