

Manfred Kaltenbacher  
Graz University of Technology  
Institute of Fundamentals and Theory in Electrical Engineering (4370)



## Scientific Career

2020 -            Head of Institute of Fundamentals and Theory in Electrical Engineering, TU Graz, Austria  
2012 - 2021      Full Professor for Measurement and Actuator Technology, Institute of Mechanics and Mechatronics, TU  
Wien, Austria  
2008 - 2012      Full Professor for Applied Mechatronics, Institute of Smart System Technologies, University of  
Klagenfurt, Austria  
                    PostDoc, Department of Sensor Technology, Friedrich-Alexander University Erlangen-Nuremberg,  
Germany  
1992 - 1999      Research and teaching assistant, Institute of Measurement Technology, Johannes Kepler University  
Linz, Austria

## Honors

**Doctor Honoris Causa (Dr. h.c.) from Budapest University of Technology and Economics**  
Kaltenbacher, M. (Recipient), 2020

**Österreichische Akademie der Wissenschaft**  
Kaltenbacher, M. (Recipient), 2017

## Activities

**Acta Acustica (Journal)**  
Kaltenbacher, M. (Editor)  
1 May 2020 → ...

**International Commission for Acoustics (External organisation)**  
Kaltenbacher, M. (Member)  
1 Oct 2019 → 30 Sept 2022

**Österreichische Akademie der Wissenschaften (External organisation)**  
Kaltenbacher, M. (Member)  
1 May 2017 → ...

**DEGA - Deutsche Gesellschaft für Akustik e.V. (External organisation)**  
Kaltenbacher, M. (Member)  
Mar 2017 → ...

**Acta Mechanica (Journal)**  
Kaltenbacher, M. (Editorial board member)  
2017 → ...

**Austrian Acoustics Association (External organisation)**  
Kaltenbacher, M. (Chair)  
2017 → ...

**Austrian National Committee for Theoretical and Applied Mechanics (External organisation)**  
Kaltenbacher, M. (Chair)

2017 → ...

**Gesellschaft für Angewandte Mathematik und Mechanik e.V. (External organisation)**

Kaltenbacher, M. (Member)

2016 → ...

**Journal of Theoretical and Computational Acoustics (Journal)**

Kaltenbacher, M. (Editorial board member)

2013 → ...

**The American Institute of Aeronautics and Astronautics (External organisation)**

Kaltenbacher, M. (Member)

2005 → ...

**International Compumag Society (External organisation)**

Kaltenbacher, M. (Member)

1999 → ...

**IEEE Magnetics Society (External organisation)**

Kaltenbacher, M. (Member)

1997 → ...

## Journal publications (at TU Graz)

**Revisiting the dry friction-like magnetic vector hysteresis model**

Sauseng, A., Kaltenbacher, M. & Roppert, K., 15 Aug 2024, In: Journal of Magnetism and Magnetic Materials. 604, 172285.

**Comparison of a quasi Newton method using Broyden's update formula and an adjoint method for determining local magnetic material properties of electrical steel sheets**

Gschwentner, A., Kaltenbacher, M., Kaltenbacher, B. & Roppert, K., 30 Jul 2024, In: COMPEL - The International Journal for Computation and Mathematics in Electrical and Electronic Engineering. 43, 4, p. 962-976 15 p.

**Hybrid aeroacoustic investigation of turbulent 90° pipe bend flow with source terms from Large-Eddy Simulation**

Tieber, J., Steiner, H., Maurerlehner, P., Schoder, S., Schäfer, K., Ennemoser, A., Kaltenbacher, M. & Brenn, G., 30 Jul 2024, In: Computers & Fluids. 279, 14 p., 106323.

**Optimization of Sensor Placement for a Measurement System for the Determination of Local Magnetic Material Properties**

Reinbacher-Köstinger, A., Gschwentner, A., Museljic, E. & Kaltenbacher, M., 16 Jul 2024, In: Mathematics. 12, 14, 2220.

**Incorporation of a 3D Energy-Based Vector Hysteresis Model into the Finite Element Method using a Reduced Scalar Potential Formulation**

Domenig, L. D., Roppert, K. & Kaltenbacher, M., 1 Jun 2024, In: IEEE Transactions on Magnetics. 60, 6, p. 1-8 8 p., 7300708.

**Inverse Scheme to Locally Determine Nonlinear Magnetic Material Properties: Numerical Case Study**

Kaltenbacher, M., Gschwentner, A., Kaltenbacher, B., Ulbrich, S. & Reinbacher-Köstinger, A., May 2024, In: Mathematics. 12, 10, 1586.

**Evaluation of an Analytical Equivalent Hertzian Dipole Representation in TEM-Cells applying the Finite Element Method**

Kreindl, D., Bauernfeind, T., Weiss, B., Stockreiter, C. & Kaltenbacher, M., 1 Mar 2024, In: IEEE Transactions on Magnetics. 60, 3, p. 1-4 4 p., 7401204.

### **Identification of Parameters to correctly adapt Energy-Based Hysteresis Models regarding Rotational Losses**

Domenig, L. D., Roppert, K., Gschwentner, A., Sauseng, A. & Kaltenbacher, M., 1 Mar 2024, In: IEEE Transactions on Magnetics. 60, 3, p. 1-4 4 p., 7300404.

### **Experimental Prediction Method of Free-Field Sound Emissions Using the Boundary Element Method and Laser Scanning Vibrometry**

Wurzinger, A., Kraxberger, F., Maurerlehner, P., Mayr-Mittermüller, B., Rucz, P., Sima, H., Kaltenbacher, M. & Schoder, S., Mar 2024, In: Acoustics. 6, 1, p. 65-82 18 p.

### **Modeling Anisotropic Electrical Conductivity of Blood: Translating Microscale Effects of Red Blood Cell Motion into a Macroscale Property of Blood**

Jafarinia, A., Badeli, V., Krispel, T., Melito, G. M., Brenn, G., Reinbacher-Köstinger, A., Kaltenbacher, M. & Hochrainer, T., 1 Feb 2024, In: Bioengineering. 11, 2, 19 p., 147.

### **Development of a PCB-Based Field Metric Measurement System for the Rotational Single Sheet Tester**

Gschwentner, A., Embacher, M., Roppert, K. & Kaltenbacher, M., 2024, In: IEEE Transactions on Magnetics. 60, 12, 6100207.

### **Employing automatic differentiation and neural networks for parameter identification of an energy based hysteresis model**

Museljic, E., Roppert, K., Domenig, L. D., Reinbacher-Köstinger, A. & Kaltenbacher, M., 14 Dec 2023, In: International Journal of Applied Electromagnetics and Mechanics. 73, 4, p. 415-427 13 p.

### **A validated finite element model for room acoustic treatments with edge absorbers**

Kraxberger, F., Kurz, E., Weselak, W., Kubin, G., Kaltenbacher, M. & Schoder, S., 18 Oct 2023, In: Acta Acustica. 7, 19 p., 48.

### **Development of a test rig for the investigation of flow-induced mechanisms of sound generation at radial fans**

Uffinger, T., Czwielong, F., Renz, A., Heidegger, P., Schoder, S., Kaltenbacher, M. & Becker, S., Aug 2023, In: Applied Acoustics. 211, 109553.

### **Determination of Local Magnetic Material Properties using an Inverse Scheme**

Gschwentner, A., Roppert, K. (Guest editor) & Kaltenbacher, M. (Guest editor), 28 Jul 2023, (E-pub ahead of print) In: IEEE Transactions on Magnetics. 4 p.

### **High-order non-conforming discontinuous Galerkin methods for the acoustic conservation equations**

Heinz, J., Munch, P. & Kaltenbacher, M., 15 May 2023, In: International Journal for Numerical Methods in Engineering. 124, 9, p. 2034-2049 16 p.

### **3D modeling of inductive and capacitive coupling between surface-mounted multilayer-capacitors**

Riener, C. M., Bauernfeind, T., Baumgartner, P., Hackl, H., Ibel, M. G., Kvasnicka, S., Prestros, R., Roppert, K. & Kaltenbacher, M., 1 May 2023, In: International Journal of Numerical Modelling. 36, 3, p. 1-20 e3046.

### **Model Reduction of Linear Differential-Algebraic Equation Systems Using Constructed Spectral Projectors**

Kvasnicka, S., Roppert, K. & Kaltenbacher, M., 1 May 2023, In: IEEE Transactions on Magnetics. 59, 5, 7001404.

### **Anisotropic minimum dissipation subgrid-scale model in hybrid aeroacoustic simulations of human phonation**

Lasota, M., Šidlof, P., Maurerlehner, P., Kaltenbacher, M. & Schoder, S., Feb 2023, In: The Journal of the Acoustical Society of America. 153, 2, p. 1052-1063 12 p.

### **A validated modeling strategy for piezoelectric MEMS loudspeakers including viscous effects**

Guilvaiee, H. H., Heyes, P., Novotny, C., Kaltenbacher, M. & Toth, F., 2023, In: Acta Acustica. 7, 24.

### **Mikroperforierte Schallabsorber für die Anwendung in strömungakustischen Problemstellungen**

Czwielong, F., Floss, S., Maurerlehner, P., Toth, F., Kaltenbacher, M., Becker, S. & Schoder, S., 2023, In: Akustik Journal. 2023, 1, p. 22-33

**A non-conforming finite element formulation for modeling compressible viscous fluid and flexible solid interaction**  
Guilvaee, H. H., Toth, F. & Kaltenbacher, M., 30 Dec 2022, In: International Journal for Numerical Methods in Engineering. 123, 24, p. 6127-6147 21 p.

**Monitoring of false lumen thrombosis in type B aortic dissection by impedance cardiography - A multiphysics simulation study**

Badeli, V., Jafarina, A., Melito, G. M., Müller, T. S., Reinbacher-Köstinger, A., Hochrainer, T., Brenn, G., Ellermann, K., Biro, O. & Kaltenbacher, M., 12 Dec 2022, (E-pub ahead of print) In: International Journal for Numerical Methods in Biomedical Engineering. e3669.

**Semi-implicit fluid–structure interaction in biomedical applications**

Schussnig, R., Pacheco, D. R. Q., Kaltenbacher, M. & Fries, T. P., 1 Oct 2022, In: Computer Methods in Applied Mechanics and Engineering. 400, 115489.

**Nonconforming finite element formulation for the simulation of impedance cardiography**

Kaltenbacher, M., Badeli, V. & Reinbacher-Koestinger, A., 16 Sept 2022, (E-pub ahead of print) In: International Journal of Numerical Modelling. e3063.

**An approach for modal coupling based on experimental and computed modes using non-conforming grids**

Engelmann, R., Toth, F., Gabriel, C. & Kaltenbacher, M., 15 Sept 2022, In: Journal of Sound and Vibration. 534, 117041.

**Error detection and filtering of incompressible flow simulations for aeroacoustic predictions of human voice**

Schoder, S., Kraxberger, F., Falk, S., Wurzinger, A., Roppert, K., Kniesburgs, S., Döllinger, M. & Kaltenbacher, M., 1 Sept 2022, In: The Journal of the Acoustical Society of America. 152, 3, p. 1425-1436 12 p.

**Fundamental Investigation of Wave Propagation inside IC-Striplines upon Excitation with Hertzian Dipole Moments**

Kreindl, D., Bauernfeind, T., Weiss, B., Stockreiter, C., Yenumula, S. K., Narayanan, B. & Kaltenbacher, M., 10 Aug 2022, In: Electronics. 11, 16, 2488.

**Numerical Investigation of Signal Launch Imperfections for Edge Mount RF Connectors**

Riener, C. M., Bauernfeind, T., Kvasnicka, S., Roppert, K., Hackl, H. & Kaltenbacher, M., 1 Jul 2022, In: Electronics. 11, 13, 1990.

**Computation of rotational hysteresis losses by vector Preisach models based on rotational operators**

Nierla, M., Kaltenbacher, M. & Rupitsch, S., 14 Apr 2022, In: COMPEL - The International Journal for Computation and Mathematics in Electrical and Electronic Engineering. 41, 3, p. 981-995 15 p.

**Predicting Spatial Distributions of Lighthill's Aeroacoustic Source Terms Using Steady-State RANS Simulations in Turbocharger Compressors**

Freidhager, C., Maurerlehner, P., Roppert, K., Heinisch, M., Renz, A., Schoder, S. & Kaltenbacher, M., 1 Jan 2022, In: Journal of Aerospace Engineering. 35, 1, 14 p., 04021101.

**Aeroacoustic formulations for confined flows based on incompressible flow data**

Maurerlehner, P., Schoder, S., Tieber, J., Freidhager, C., Steiner, H., Brenn, G., Schäfer, K.-H., Ennemoser, A. & Kaltenbacher, M., 2022, In: Acta Acustica. 6, 14 p., 45.

**Applicability of two hybrid sound prediction methods for assessing in-duct sound absorbers of turbocharger compressors**

Freidhager, C., Schoder, S., Maurerlehner, P., Renz, A., Becker, S. & Kaltenbacher, M., 2022, In: Acta Acustica. 6, 13 p., 37.

**A New Method for Sound Generation Based on Digital Sound Reconstruction**

Mayrhofer, D. & Kaltenbacher, M., Dec 2021, In: Journal of Theoretical and Computational Acoustics. 29, 4, 2150021.

### **Investigation of a new method for sound generation – Advanced Digital Sound Reconstruction**

Mayrhofer, D. & Kaltenbacher, M., Jun 2021, In: Elektrotechnik und Informationstechnik. 138, 3, p. 148-154 7 p.

### **Mikroperforierte Platten zur Schallreduktion**

Floss, S., Czwiolong, F., Becker, S. & Kaltenbacher, M., Jun 2021, In: Elektrotechnik und Informationstechnik. 138, 3, p. 171-178 8 p.

### **Schallquellenlokalisierung: state of the art und neues inverses Verfahren**

Gombots, S., Nowak, J. & Kaltenbacher, M., Jun 2021, In: Elektrotechnik und Informationstechnik. 138, 3, p. 229-243 15 p.

### **Simulationen von Strömungsakustik in rotierenden Bauteilen zur Entwicklung von Antriebskonzepten der Autos der Zukunft**

Freidhager, C., Maurerlehner, P., Roppert, K., Wurzinger, A., Hauser, A., Heinisch, M., Schoder, S. & Kaltenbacher, M., Jun 2021, In: Elektrotechnik und Informationstechnik. 138, 3, p. 212-218 7 p.

### **3D-FV-FE aeroacoustic larynx model for investigation of functional based voice disorders**

Falk, S., Kniesburges, S., Schoder, S., Jakubaß, B., Maurerlehner, P., Echternach, M., Kaltenbacher, M. & Döllinger, M., 8 Mar 2021, In: Frontiers in Physiology. 12, 616985.

### **Aeroacoustic Sound Source Characterization of the Human Voice Production - Perturbed Convective Wave Equation**

Schoder, S., Maurerlehner, P., Wurzinger, A., Hauser, A., Falk, S., Kniesburges, S., Döllinger, M. & Kaltenbacher, M., 2 Mar 2021, In: Applied Sciences. 11, 6, 2614.

### **Sliding Non-Conforming Interfaces for Edge Elements in Eddy Current Problems**

Roppert, K., Schoder, S., Wallinger, G. & Kaltenbacher, M., 1 Mar 2021, In: IEEE Transactions on Magnetics. 57, 3, p. 1-6 6 p., 9312633.

### **Application limits of conservative source interpolation methods using a low Mach number hybrid aeroacoustic workflow**

Schoder, S., Wurzinger, A., Junger, C., Weitz, M., Freidhager, C., Roppert, K. & Kaltenbacher, M., Mar 2021, In: Journal of Theoretical and Computational Acoustics. 29, 1, 2050032.

### **Influence of a micro-perforated duct absorber on sound emission and performance of axial fans**

Czwiolong, F., Floss, S., Kaltenbacher, M. & Becker, S., Mar 2021, In: Applied Acoustics. 174, 107746.

### **Impact of the Sub-Grid Scale Turbulence Model in Aeroacoustic Simulation of Human Voice**

Lasota, M., Šidlof, P., Kaltenbacher, M. & Schoder, S., 2 Feb 2021, In: Applied Sciences. 11, 4, p. 1-19 19 p., 1970.

### **A pseudo density topology optimization approach in nonlinear electromagnetism applied to a 3D actuator**

Seebacher, P., Kaltenbacher, M., Wein, F. & Lehmann, H., 2021, In: International Journal of Applied Electromagnetics and Mechanics. 65, 3, p. 545-559 15 p.

### **Capabilities of inverse scheme for acoustic source localization at low frequencies**

Gombots, S., Kaltenbacher, M. & Kaltenbacher, B., 2021, In: Acta Acustica. 5, 44.

### **Design of an in-duct micro-perforated panel absorber for axial fan noise attenuation**

Floss, S., Czwiolong, F., Kaltenbacher, M. & Becker, S., 2021, In: Acta Acustica. 5, 24.

### **Efficient numerical simulation of the human voice: simVoice – a three-dimensional simulation model based on a hybrid aeroacoustic approach**

Maurerlehner, P., Schoder, S., Freidhager, C., Wurzinger, A., Hauser, A., Kraxberger, F., Falk, S., Kniesburges, S., Echternach, M., Döllinger, M. & Kaltenbacher, M., 2021, In: Elektrotechnik und Informationstechnik. 138, 3, p. 219-228 10 p.

**Sound reduction in heat exchanger modules by integrating plate absorbers with sub-millimeter openings**

Czwielong, F., Floss, S., Kaltenbacher, M. & Becker, S., 2021, In: Acta Acustica. 5, 35.

**Helmholtz's decomposition for compressible flows and its application to computational aeroacoustics**

Schoder, S., Roppert, K. & Kaltenbacher, M., 6 Nov 2020, In: Partial Differential Equations and Applications. 1, 20 p., 46.

**Computational aeroacoustics of the EAA benchmark case of an axial fan**

Schoder, S., Junger, C. & Kaltenbacher, M., 14 Oct 2020, In: Acta Acustica. 4, 5, 17 p., 22.

**Bi-Stable Aluminum Nitride-Based Piezoelectric Micromachined Ultrasonic Transducer (PMUT)**

Schneider, M., Dorfmeister, M., Moll, P., Kaltenbacher, M. & Schmid, U., Oct 2020, In: Journal of Microelectromechanical Systems. 29, 5, p. 948-953 6 p., 9130699.

**Aeroacoustic source term computation based on radial basis functions**

Schoder, S., Roppert, K., Weitz, M., Junger, C. & Kaltenbacher, M., 15 May 2020, In: International Journal for Numerical Methods in Engineering. 121, 9, p. 2051-2067 17 p.

**Hybrid aeroacoustic approach for the efficient numerical simulation of human phonation**

Schoder, S., Weitz, M., Maurerlehner, P., Hauser, A., Falk, S., Kniesburgs, S., Doellinger, M. & Kaltenbacher, M., Feb 2020, In: The Journal of the Acoustical Society of America. 147, 2, p. 1179-1194 16 p., 1179.

**Postprocessing of Direct Aeroacoustic Simulations Using Helmholtz Decomposition**

Schoder, S., Roppert, K. & Kaltenbacher, M., 1 Jan 2020, In: AIAA Journal. 58, 7, p. 3019-3027 9 p.

**Modeling Nonlinear Steady-State Induction Heating Processes**

Roppert, K., Kaltenbacher, M. & Toth, F., 2020, In: IEEE Transactions on Magnetics. 56, 3, 4 p., 8959364.

**Non-Conforming Nitsche Interfaces for Edge Elements in curl-curl Type Problems**

Roppert, K., Schoder, S., Toth, F. & Kaltenbacher, M., 2020, In: IEEE Transactions on Magnetics. 56, 5, 7 p., 9034161.

**Hybrid Aeroacoustic Computations: State of Art and New Achievements**

Schoder, S. & Kaltenbacher, M., Dec 2019, In: Journal of Theoretical and Computational Acoustics. 27, 4, 1950020.

**Comparison of different vector Preisach models for the simulation of ferromagnetic materials**

Nierla, M., Loeffler, M., Kaltenbacher, M. & Rupitsch, S. J., 21 Oct 2019, In: COMPEL - The International Journal for Computation and Mathematics in Electrical and Electronic Engineering. 38, 5, p. 1696-1710 15 p.

**Revisiting infinite mapping layer for open domain problems**

Schoder, S., Toth, F., Freidhager, C. & Kaltenbacher, M., 1 Sept 2019, In: Journal of Computational Physics. 392, p. 354-367

**Computational Models of Laryngeal Aerodynamics: Potentials and Numerical Costs**

Sadeghi, H., Kniesburgs, S., Kaltenbacher, M., Schützenberger, A. & Döllinger, M., Jul 2019, In: Journal of Voice. 33, 4, p. 385-400 16 p.

**Towards a clinically applicable computational larynx model**

Sadeghi, H., Kniesburgs, S., Falk, S., Kaltenbacher, M., Schützenberger, A. & Döllinger, M., 1 Jun 2019, In: Applied Sciences. 9, 11, 2288.

**Aerodynamic impact of the ventricular folds in computational larynx models**

Sadeghi, H., Döllinger, M., Kaltenbacher, M. & Kniesburgs, S., 1 Apr 2019, In: The Journal of the Acoustical Society of America. 145, 4, p. 2376-2387 12 p.

On the Application of Acoustic Analogies in the Numerical Simulation of Human Phonation Process  
Valášek, J., Kaltenbacher, M. & Sváček, P., 15 Jan 2019, In: Flow, Turbulence and Combustion. 102, 1, p. 129-143 15 p.

**Numerical investigation of the resonance behavior of flow-excited Helmholtz resonators**

Weitz, M., Schoder, S. & Kaltenbacher, M., 2019, In: Proceedings in Applied Mathematics and Mechanics . 19, 1, 2 p.

**Simulating induction heating processes using harmonic balance FEM**

Roppert, K., Toth, F. & Kaltenbacher, M., 2019, In: COMPEL - The International Journal for Computation and Mathematics in Electrical and Electronic Engineering. 2019, 5, p. 1562-1574

**Computational Aeroacoustics Based on a Helmholtz-Hodge Decomposition**

Kaltenbacher, M. & Schoder, S., 13 Jun 2018, In: SAE Technical Papers. 6 p., 2018-01-1493.

**Hybrid computational aeroacoustics based on compressible flow data at low Mach numbers**

Schoder, S., Toth, F. & Kaltenbacher, M., 15 Mar 2018, In: Proceedings in Applied Mathematics and Mechanics . p. 687-688 2 p.