

Siegfried Hörmann

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Personal Data

Nationality: Austrian;
Languages: German (native), English (fluent), French (proficient).

Education

November 2006.

Ph.D. in Mathematics (with excellence), Graz University of Technology, Austria.
Thesis: “*Fluctuation analysis of dependent random processes*”.
Advisor: István Berkes.

April 2003.

M.S. in Mathematics (with excellence), University of Salzburg, Austria.
Thesis: “*Theory and application of ladder variables*”.
Advisor: Maximilian Thaler.

Research Interests

Mathematical statistics (change-point analysis, functional data, inference);
Time series analysis (GARCH models, functional time series);
Probability theory (fluctuation theory, limit theorems, weak dependence);
Stochastic processes (empirical processes, invariance principles, strong approximations);
Applied statistics (environmental statistics).

Employment

August 2009 –

Chargé de Cours (Associate Professor), Mathematics Department, Université Libre de Bruxelles, Belgium.

July 2007 – June 2009

Assistant Professor (Lecturer), Department of Mathematics, University of Utah, USA.

Aug 2003 – Jul 2007

Research Assistant, Department of Statistics, Graz University of Technology, Austria.

Honors and Awards

- 2010** ARC research grant on the project *Robust Static and Dynamic Dependence Models* (joint with C. Dehon and D. Paindaveine). 450000 Euro.
- 2010** Research grant from the Banque nationale de Belgique on the project *Non-linear functional time series for financial data*. 7500 Euro.
- 2008** Laha Award of the IMS.
- 2007** Award of the Austrian Mathematical Society for best doctoral thesis.
- 2003** Hans-Stegbuchner-Award from the Department of Mathematics, University of Salzburg, for my master's thesis.

Accepted Publications

- [1] Hörmann, S., Kokozka, P. *Consistency of the mean and the principal components of spatially distributed functional data*. Bernoulli. Forthcoming.
- [2] Aue, A., Hörmann, S., Horváth, L., Hušková, M., Steinebach, J. (2012). *Sequential testing for the stability of high frequency portfolio betas*. *Econometric Theory*, 28, 1–34.
- [3] Hörmann, S., Kokoszka, P. *Functional Time Series*. Handbook of Statistics. Forthcoming.
- [4] Aistleitner, C., and Hörmann, S. (2011). *Upper and lower class separating sequences for Brownian motion with random argument*. *Probab. Math. Stat.*, 31, 183–202.
- [5] Berkes, I., Hörmann, S., Schauer, J. (2011). *Split invariance principles for stationary processes*. *The Annals of Probability*, 39, 2441–2473.
- [6] Hörmann, S., Kokoszka, P. (2010). *Weakly dependent functional data*. *The Annals of Statistics*, 38, 1845–1884.
- [7] Hörmann, S. (2009). *Berry-Esseen bounds for econometric time series*. *ALEA*, 6, 377–397.
- [8] Aue, A., Hörmann, S., Horváth, L., Reimherr, M. (2009). *Break detection in the covariance structure of multivariate time series models*. *The Annals of Statistics*, 37, 4046–4087.
- [9] Berkes, I., Hörmann, S., Weber, M. (2010) *Upper-lower class tests for weighted i.i.d. sequences and martingales*. *J. Theoretical Probability*, 23, 428–446.
- [10] Berkes, I., Hörmann, S., Horváth, L. (2010). *On functional versions of the arc-sine law*. *J. Theoretical Probability*, 23, 109–126.
- [11] Berkes, I., Hörmann, S., Schauer, J. (2009). *Asymptotic results for the empirical process of stationary sequences*. *Stoch. Proc. Appl.*, 119, 1298–1324.
- [12] Berkes, I., Hörmann, S., Horváth, L. (2008). *The functional central limit theorem for a family of GARCH models*. *Stat. Probab. Lett.*, 78, 2725–2730.
- [13] Hörmann, S. (2008). *Augmented GARCH sequences: dependence structure and asymptotics*. *Bernoulli* 14, 543–561.
- [14] Hörmann, S., Pfeiler, B., Stadlober, E. (2008). *Quality and performance of a PM10 daily forecasting model*. *Atmospheric Environment* 42, 1098–1109.

- [15] Friedl, H., Hörmann, S. (2008). *Frequentist probability theory*, In: Handbook of Probability. Theory and Applications, Sage Publications.
- [16] Hörmann, S. (2007). *On the universal a.s. central limit theorem*. Acta Math. Hungarica 116, 377–398.
- [17] Hörmann, S. (2007). *Critical behavior in almost sure central limit theory*. J. Theoretical Probability 20, 613–636.
- [18] Hörmann, S. (2006). *Asymptotic properties of augmented GARCH (1,1) sequences*. In: Proc. Prague Stochastics, 407–417.
- [19] Hörmann, S. (2006). *An extension of almost sure central limit theory*. Stat. Probab. Lett. 76, 191–202.
- [20] Hörmann, S., Pfeiler, B., Stadlober, E. (2005). *Analysis and prediction of particulate matter PM10 for the winter season in Graz*. Austrian J. Stat. 34, 307–326.
- [21] Hörmann, S. (2005). *A note on the almost sure convergence of central order statistics*. Probab. Math. Stat. 25, 317–329.
- [22] Hörmann, S. (2004). *Optimal averaging procedures in almost sure central limit theory*. Metodološki zvezki 2, 407–418.

Papers Pending or in Preparation

- [23] Hörmann, S., Horváth, L., and Reeder, R. *A functional version of the ARCH model*. (Submitted.)
- [24] Gabrys, R., Hörmann, S., Kokozka, P. *Monitoring the intraday volatility pattern*. (Submitted.)
- [25] Hörmann, S., Swan, Y. *A remark on the normal approximation error of randomly weighted self-normalized sums*. (Submitted.)
- [26] Berkes, I., Hörmann, S. *On split approximation for dependent sequences*. (Submitted.)
- [27] Aue, A., Hörmann, S., Horváth, L., Hušková, M. *Dependent functional linear models with applications to monitoring structural change*. (Submitted.)
- [28] Dubart Norinho, D., Hörmann, S. *Forecasting functional time series with applications to PM10 curve prediction*. (Working title. In preparation.)
- [29] Hörmann, S., Horváth, L. *A strong invariance principle for marked empirical processes with applications to change detection in threshold AR models*. (In preparation.)
- [30] Berkes, I., Hörmann, S. *On the equivalence of LIL and pathwise CLT behavior*. (In preparation.)

Invited Presentations

Monitoring the intraday volatility pattern. ERCIM congress, London (UK), December 2011.

FPCA for Sequential and Spatial Data. Department of Operations Research and Financial Engineering. Seminar. Princeton University (USA), December 2011.

Using FDA techniques for econometric time series. Wakayama Symposium, Wakayama (Japan), December 2011.

Functional PCA under temporal and spatial dependence. Recent Developments in Statistics, Empirical Finance and Econometrics. Kyoto (Japan), November 2011.

Break detection in the covariance structure of multivariate time series models. Seminar. School of Public Health, University of Tampere (Finland), May 2011.

Functional Principal Component Analysis for Sequential and Spatial Data. Workshop on "Dependence in Probability and Statistics", CIRM Luminy (France). April 2011.

Consistency of the mean and the principal components of spatially distributed functional data. Seminar. Department of Statistics, Charles University in Prague. (Czech Republic), April 2011.

Functional Principal Component Analysis for Sequential and Spatial Data. Seminar. Institute for Mathematical Stochastics, University of Göttingen (Germany), January 2011.

Break detection in the covariance structure of multivariate time series models. Seminar. Mathematical Faculty, Ruhr-University Bochum (Germany), November 2010.

Functional Principal Component Analysis for Sequential and Spatial Data. Seminar. Department of Statistics, Graz University of Technology (Austria), November 2010.

Analysis and Prediction of Particulate Matter PM10 in Graz. Seminar. Department of Mathematics and Statistics, Utah State University, Logan (USA), September 2010.

Weakly dependent functional data. Seminar. Mathematical Institute, University of Cologne (Germany), June 2010.

Weakly dependent functional data. Seminar. OR and Business Statistics, K.U. Leuven (Belgium), May 2010.

Weakly dependent functional data. Seminar. Université Lille 3 (France), March 2010.

Sequential testing for the stability of high frequency portfolio betas. Workshop on "Structural Breaks in Time Series". Lambrecht (Germany), February 2010.

Weakly dependent functional data. Seminar. Department of Mathematics, University of Hamburg (Germany), February 2010.

Change-point detection for financial time series models. Seminar. Department of Mathematics and Computer Science, FU-Berlin (Germany), November 2009.

A moment based notion of dependence for functional time series. Seminar. Department of Mathematical and Statistical Sciences, University of Alberta, Edmonton (Canada), September 2009.

Asymptotic theory for weakly dependent functional data. Symposium on "New Directions in Asymptotic Statistics", Athens (Georgia, USA), May 2009.

A powerful approach for the analysis of dependent processes. ISDS Colloquium, Institut für Statistik und Decision Support Systems, Vienna (Austria), June 2008.

Break detection in the covariance structure of multivariate time series models. Conference. IISA meeting, University of Connecticut, Storrs (USA), May 2008.

Analysis of dependent data. Seminar. Department of Mathematics and Statistics, Utah State University, Logan (USA), October 2007.

Bedingt heteroskedastische Zeitreihenmodelle. Seminar. Department of Mathematics, University of Salzburg, (Austria), June 2007.

Augmented GARCH sequences, dependence and asymptotics. Conference. Statistical Models for Financial Data II, Graz (Austria), May 2007.

Untersuchungen zur Feinstaubproblematik PM10 in Graz. Seminar. Diskussionsforum Junge Statistik, Vienna (Austria), March 2006.

Other International Conference Presentations

Consistency of the mean and principal components of spatially distributed functional data, poster presentation, 2nd International Workshop on Functional and Operatorial Statistics, Santander (Spain), June 2011.

Split-invariance principles for stationary processes, 10th International Vilnius Conference on Probability and Mathematical Statistics, Vilnius (Lithuania), June 2010.

Split-invariance principles for stationary processes, German Open Conference on Probability and Statistics, Leipzig (Germany), March 2010.

A Moment Based Notion of Dependence for Functional Time Series, poster presentation, NBER-NSF Time Series Conference, Davis (USA), September 2009.

A strong invariance principle for the two-parameter empirical process of stationary sequences, Workshop on Limit Theorems, Prague (Czech Republic), August 2009.

Break detection in the covariance structure of multivariate time series models, poster presentation, Statistical Science Symposium/Shumway Lectures, Davis (USA), April 2009.

Augmented GARCH sequences, dependence and asymptotics, 7th World Congress in Probability and Statistics (Singapore), July 2008.

Asymptotic properties of augmented GARCH (1,1) sequences, Prague Stochastics 2006, Prague (Czech Republic), August 2006.

Critical behavior in almost sure central limit theory, 9th International Vilnius Conference on Probability Theory and Mathematical Statistics, Vilnius (Lithuania), June 2006.

Investigations on Particulate Matter PM10 in Graz, ROeS Seminar, Graz (Austria), September 2005.

Optimal averaging procedures in almost sure central limit theory, 9th Young Statistician Meeting, Rimini (Italy), October 2004.

Summability methods in almost sure central limit theory, Statistische Wochen 2004, Vienna (Austria), September 2004.

Teaching

ULB: Graduate Statistics I, Graduate Statistics II, Advanced Topics in Mathematical Statistics, Time Series Analysis I, Time Series Analysis II, Analyse Multivariée.

University of Utah: Applied Statistics, Time Series Analysis, Linear Models, Multilinear Models.

Graz University of Technology: Advance Probability Theory, Probability and Stochastic Processes.

University of Tampere: Functional Data Analysis (short course).

Theses Supervised

Kim Schalbar, ULB. Master Thesis on *Properties and Structure of GARCH models and their Generalizations.*

Diogo Dubart Norinho, ULB. Master Thesis on *Functional AR(1) processes: asymptotic theory and forecasting.*

Further Professional Activities

Organizer of the statistics seminar series at ULB.

Referee for the following journals: Annals of Statistics, Austrian Journal of Statistics, Computational Statistics, Computational Statistics and Data Analysis, Econometric Theory, Electronic Communications in Probability, Extremes, Glasnik Matematički, International Statistical Reviews, JASA, Journal of Applied Probability, Journal of Econometrics, Journal of Mathematical Analysis and Applications, Journal of Statistical Planning and Inference, Journal of the Royal Statistical Society, Journal of Theoretical Probability, Journal of Time Series Analysis, Metrika, Rocky Mountain Journal of Mathematics, Periodica Mathematica Hungarica, Probability and Mathematical Statistics, Statistical Methodology, Statistics, Statistics and Probability Letters, Stochastic Processes and their Applications.

Reviewer for Mathematical Reviews.

Editorial work for the Austrian Journal of Statistics, 2007.

Member of the local organizing committee of the 10th Young Statisticians Meeting, Seggau (Austria), 2005.

Project collaborator at the EU-Life Project KAPA-GS, 2004–2007.

Collaborators

Christoph Aistleitner (Graz University of Technology)

Alexander Aue (UC Davies)

Istvan Berkes (Graz University of Technology)

Herwig Friedl (Graz University of Technology)

Robertas Gabrys (University of Southern California)

Lajos Horváth (University of Utah)

Marie Hušková (Charles University)

Piotr Kokoszka (Colorado State University)

Brigitte Pfeiler (Graz University of Technology)

Ron Reeder (University of Utah)

Matthew Reimherr (University of Chicago)

Johannes Schauer (Graz University of Technology)

Ernst Stadlober (Graz University of Technology)

Josef Steinebach (University of Cologne)

Yvik Swan (ULB)

Michel Weber (University of Strasbourg)