

Curriculum vitae (May 2013)

Name, Date of birth: Holger Rootzén, born March 25, 1945
Affiliation: Chalmers, Mathematical Sciences, Ph. +46 730 794222
e-mail: hrootzen@chalmers.se,
webpage : <http://www.math.chalmers.se/~rootzen/>

Research achievements in brief

Rootzén has contributed key ideas to Statistical Extreme Value Theory. His ideas on how heavy-tailed variables influence systems have been a basic ingredient in, perhaps, more than a thousand papers, and will be for more. He has also made central contributions to extremes of Gaussian and Markov processes and recently he together with Hsing was able to obtain a general understanding of the extremes on trees. Together with Tajvidi he found the right definition of the multivariate Generalized Pareto distribution – and proved that it indeed is the correct one. This result forms a basis for multivariate modeling of extreme episodes, such as the temporal and spatial behavior of wind speeds in a wind storm. Together with Drees he, in a paper published last year, developed a general empirical process theory for extreme episodes. This makes it possible to push through rigorous asymptotic analysis also for quite advanced statistical methods. Rootzén has also adapted extreme value methods for practical use in wind storm modeling, metal fatigue, pit corrosion analysis, and wind storm insurance, in close collaboration with researchers from these areas.

In the 1990-ies it became clear that standard teletraffic analysis did not suffice for modeling of internet traffic. Rootzén used the opportunity to collect a group of postdocs and guest researchers to work with new models for TCP traffic. The results account for long the range dependence and heavy tails which shape the behavior of internet traffic, and continue to be influential.

In earlier work Rootzén took the last step in the solution of the classical Martingale Central Limit Problem and also showed how to measure the error in approximations of stochastic integrals. The latter is now finding significant application in finance. He has led extensive collaboration projects with the car, medical, telecommunication, chemical, and insurance industry. This has lead to three patents and two commercial successes.

Rootzén has recieved many research grants. In particular he is chairman for the Gothenburg Stochastic centre which has had continued support exceeding 5 MSEK/year the last 15 years, for basic research in stochastics. He leads the strategic research centre GMMC, the Gothenburg Mathical Modeling Centre. GMMC has obtained 26 MSEK in funding for 1996-2011 and does joint research, going all the way from basic theory to finished products, with industry and other science. He has supervised 10 PhDs, 5 licentiates, and 5 postdocs. He is now advisor for Dimitri Zholud, Anna Rudvik, Jonas Alm.

Rootzén has published about 75 papers in international journals, one book which continues to be a highly cited classic, one edited book, and one compendium/textbook. He has WoS h-index 18.

Research areas

Probability; statistics; extreme values; interdisciplinary work with science, engineering, medicine, and industry.

Personal

- Undergraduate degrees in Electrical Engineering and in Business Administration, Ph.D. 1974 and Docent 1978, in Mathematical Statistics. Lund.
- Professor, Lund University 1988-1993; Lecturer, Copenhagen University, 1979-1987; Research associate, non-tenured lecturer, Lund University, 1969-1979; all in Mathematical Statistics; Teaching assistant in Telecommunication Theory, Business Administration, Mathematical Statistics, Lund University 1969; Postdoc 1974-1975, Visiting Professor spring 1979, Visiting Research Professor 1983, 1991-92, University of North Carolina at Chapel Hill.
- Married, two daughters, 10 and 36 years old. Parental leave spring 2004.

Honors

Fellow IMS, Member ISI, Elected member of the Royal Swedish Academy of Science and of Kungliga Fysiografiska Sällskapet.

Editorial Service

- Editor-in-Chief, Bernoulli 2006–2009
- Associate Editor Annals of Statistics, 2013-
- Editor-in-Chief, EXTREMES, 1996-2005;
- Editor-in-Chief, Scandinavian Journal of Statistics, 2012-2015
- Associate Editor Extremes 2006–; Annals of Applied probability 1999–2002; Stochastic Processes and their Applications 1990–1999; Scandinavian Journal of Statistics 1988–1994; Editorial committee Probability and Mathematical Statistics (Wroclaw) 1992–2004

Other Service

Now Leader Wallenberg project Big Data and Big Systems, Chairman of the council of the Stochastic Centre in Gothenburg (VR strong research environment, VR frame grant, earlier Wallenberg and SSF grants).

Past (examples): : Leader of GMMC, (an SSF strategic centre); Leader for Chalmers Initiative Seminars; Member of the board and chairman of the hiring committee for the Natural and Technical Sciences in the Swedish Research Council; Chairman of the department of Mathematical Statistics, Lund ; referee for theses and appointments, expert for research councils, member evaluation committees in Sweden, Norway, Denmark, Canada, Germany, Belgium, the Netherlands, France, Israel, the United States; Session organizer, member of scientific and organizing committees for many conferences

Postdocs

Catalin Starica 1996; Olivier Perrin 1997-98; Charles-Antoine Guerin 1997–98; Elke Thönnies fall 1998; Rasmus Waage-Petersen spring 2000; Anne-Laure Fougères 2001 + later periods; Johan Segers 2002

Ph.D. students

Ulla Holst 1982; Jonny Olsson 1991; Roland Perfekt 1994; Nader Tajvidi 1996; Johan C. Carlsson 2000; Krystina Pietrzyk 2000 (joint with Carl-Axel Hageskog); Joachim Johansson 2003; Carl Lindberg 2005 (joint with Fred Benth); Erik Brodin (joint with Patrik Albin) 2007; Alexander Herbertsson 2007; advisor for 5 additional licentiate exams. At present advisor for Dimitri Zholud, Anna Rudvik, Jonas Alm

Conference lectures

Invited talks at about 60 workshops and conferences since 2000. For 2008 – now: Vimeiro workshop EVT2013 2013; Braunschweig conference Building Bridges: Probability, Statistics and Applications, 2013;

Paris workshop Mathematical Statistics and Limit Theorems 2013; Copenhagen PhD course and workshop on extremes in space and time 2013; Lisbon workshop Recent Advanced in Extreme Value 2013; Changchun International Conference on Quantitative Finance and Risk Management 2012; Colombo conference Statistical concepts for the modern world 2011; Ascona workshop Environmental Risk and Extreme Events:, 10-15 July 2011; Copenhagen Symposium in Honour of Martin Jacobsen March 2011; Kaiserslautern workshop on Financial Mathematics March 2011;Transportforum 2011; Extreme events in climate and weather - an interdisciplinary BIRS workshop 2010; IMS annual meeting 2010; Lausanne extreme value program final conference 2009; Lausanne workshop on spatial extreme and applications 2009; BIRS workshop on Gaussian extremes 2009; Extremes, Fort Collins 2009; Norsk Statistikermöte, Oslo 2009; Eurandom workshop on climate change 2009; Abisko seminar May 2009; IWAP, Compiègne 2008; QPRC, Madison, Wisconsin 2008; ISCA, New Brunswick 2008; SAMSI workshop on multivariate extremes, Research Triangle Park 2008.

Entrepreneurship, major industry collaborations

- SHRP 2 and SemiFOT2, Naturalistic driving studies: SAFER, Volvo Car and Volvo Truck, 2010–
- Insurance risk, Realistic models for dependence: Folksam, one PhD position, 2010–
- Wind storm insurance: Länsförsäkringsbolagen, 1996–2009
- Pit corrosion analysis: Volvo Car, 1996–2004
- Visual field testing: the department of Ophthalmology in Malmö and Humphrey instruments, San Leandro, 3 PhD theses, three patents, the perimeter developed in the project is a de facto world standard and is installed in about 15.000 clinics around the world, 1982-
- Data traffic modelling: Ericsson, 1998–2002
- 3-D tolerance management: Volvo Car, 1 Licentiate, 1 PhD, 1995–2000
- Quality systems for sterility: Mölnlycke, 1 Licentiate, 1997–1998.

Teaching

Started and developed 4 new undergraduate courses since 2002, all of them rather different than standard mathematical statistics courses.

Ongoing grants

- Big Data and Big Systems – bridging local and global: Wallenberg grant, 50 MSEK, 2013-2017
- Extreme Episodes: the Swedish Research council, 2.7 MSEK, 2012-2014
- Insurance risk, Realistic models for dependence: Industrial PhD grant from the Swedish Science Research Council, 2 MSEK, 2010–2015
- SHRP 2: US Transportation Research Board, 0.5 MSEK 2013

Ten selected publications since 2002

- [1] Mikosch, T., Resnick, S., Rootzén, H., and Stegeman, A., (2002). Is network traffic approximated by stable Lévy motion or fractional Brownian motion? *Ann. Appl. Probab.* **12**, 23–68. WoS 73, GS 197 citations.
- [2] Guerin, C. A., Nyberg, H., Perrin, O., Resnick, S., Rootzén, H., and Starica, C. (2003). Empirical testing of the infinite source Poisson data traffic model. *Stoch. Mod.* **19**, 156–196. Received the Neuts 2003 best paper award. WoS 13, GS 46 citations.
- [3] Hsing, T., and Rootzén, H. (2005): Extremes on Trees. *Ann. Probab.* **33**, 413–444. WoS 2, GS 4 citations.

- [4] Rootzen, H., and Tajvidi, N. (2006). The multivariate generalized Pareto distribution. *Bernoulli* **12**, 917–930. WoS 9, GS 18 citations.
 - [5] Herbertsson, A., and Rootzén, H. (2008). Pricing k-th-to-default swaps under default contagion: the matrix-analytic method. *J. Comput. Fin.* **12**, 49–78. GS 14 citations.
 - [6] Rootzen, H. (2009). Weak convergence of the tail empirical function for dependent sequences. *Stoch. Proc. Appl.* **119**, 468–490. WoS 3, GS 6 citations.
 - [7] Fougères, A.-L., Nolan, J., and Rootzén, H. (2009) Models for dependent extremes using stable mixtures. *Scand. J. Statist.* **36**, 42–59. WoS , GS citations
 - [8] Drees, H., and Rootzen, H. (2010). Limit theorems for empirical processes of cluster functionals *Ann. Statist.* **38**, 2145–2186.
 - [9] Lindberg, C. and Rootzén, H. (2013): Error distributions for random grid approximations of multidimensional stochastic integrals. *Ann. Appl. Probab.* **23**, 834-857
 - [10] Rootzén, H. and Zholud D. (2013). Tail estimation methods for high throughput testing. *Submitted*.
- *) WoS = Tompson Web of Science, GS = Google Scholar

Five earlier well cited papers (some more important and “second generation well cited” are not on the list)

- [11] Leadbetter, M. R. and Rootzén, H. (1988). Extremal Theory for Stochastic Processes. *Ann. Probab.* **16**,431-478. WoS 101, GS 212 citations.
- [12] de Haan, L., Resnick, S., Rootzén, H., and de Vries, C. (1989). Extremal behavior of solutions to a stochastic difference equation, with applications to ARCHprocesses. *Stoch. Proc. Appl.* **32**, 213 – 224. WoS 86, GS 228 citations.
- [13] Monrad, D. and Rootzén, H. (1995). Small values of Gaussian processes and functional laws of the iterated logarithm. *Probab. Th. Rel. Fields*, **101**, 173-192. WoS 66, GS 95 citations.
- [14] Bengtsson, B., Heijl, A., Olsson, J. and Rootzén, H. (1997). A new generation of algorithms for computerized threshold perimetry, SITA. *Acta Ophthalmol. Scand.* **75**, 368-375. WoS 161, GS 232 citations.
- [15] Mikosch, T., Resnick, S., Rootzén, H. and Stegeman, A. (2002): Is networks traffic approximated by stable Lévy motion or fractional Brownian motion? *Ann. Appl. Probab.* **12**, 23-68, WoS 105, GS 233 citations

Books

G. Lindgren, M.R. Leadbetter and H. Rootzén: *Extremes and related properties of stationary sequences and processes*. Springer: New York (1983). Russian translation; Nauka: Moscow (1988), Springer has approached us about making a reprint. GS 1974 citations

G. Lindgren, M. Sandsten, H. Rootzén: *Stationary Stochastic Processes for Scientists and Engineers*, Chapman & Hall (2013)

Edited book

Extreme values in finance, telecommunication and the environment.(2003) Edited by B. Finkenstädt and H. Rootzén, Chapman & Hall. GS 61 citations

Patents

Continued maintenance of three world patents on visual field testing, with J. Olsson. A. Heijl, B. Bengtsson.

For full list of publications, see <http://www.math.chalmers.se/~hrootzen/lista.html>