

Symposium on Stochastic Processes

Friday September 26th 2014, University of Twente
at the occasion of the retirement of
Erik van Doorn



This symposium is held in honor of Erik van Doorn, at the occasion of his formal retirement from an active academic life. In several ways Erik has made a significant impact on the stochastic processes community, both within the Netherlands as well as outside. His work on quasi-stationary distributions and birth-death processes, often based on analysis involving orthogonal polynomials, is well-known around the world, but also on other topics he has made substantial contributions. Currently MathSciNet contains 58 papers by Erik, who does not yet intend to leave it at that.

It is our great pleasure to organize this symposium in his honor. We are indebted to 3TU-AMI and the STAR cluster, whose financial support made it possible to invite several international speakers for this event. We thank the speakers for their immediate and enthusiastic responses to our invitation to present some of their work on this occasion, and to reflect on the relation to Erik and his work. Finally we like to thank Erik for the many years of his life he has devoted to excellent teaching and research, and for being the kind and wonderful person he has always been and will continue to be.

The organizers,

Werner Scheinhardt
Richard Boucherie
Onno Boxma

Sponsors

We are indebted to the following institutions for financial support.

3TU-AMI



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Program

Lectures will be in Room 2K in the Carré-building. Coffee and tea are served nearby.

Lunch and reception are in the Waaier-building ('bovenring').

10.00 – 10.30 Welcome coffee and tea

10.30 – 10.45 *Opening*

10.45 – 11.30 Phil Pollett Quasi-stationary distributions: then and now

11.30 – 12.00 Frank Coolen Discrete-time Markov chains - the work of Pauline (Coolen-) Schrijner

12.00 – 13.15 Lunch in the Waaier-building ('bovenring')

13.15 – 13.45 Guy Latouche The deviation matrix, Poisson's equation, and QBDs

13.45 – 14.15 Bart van Arem Reducing randomness: the advent of self-driving cars

14.15 – 14.45 Rein Nobel The Downs-Thomson paradox revisited

14.45 – 15.15 Coffee and Tea

15.15 – 15.45 Werner Scheinhardt Random walks in dependent random environments

15.45 – 16.15 Erik van Doorn To be announced

16.15 – 18.00 Reception in the Waaier-building ('bovenring')

Abstracts

Phil Pollett

The University of Queensland, Australia

Quasi-stationary distributions: then and now

10.45 – 11.30

Abstract:

Erik van Doorn is well known for his outstanding contributions to research in several areas of stochastic processes. A common theme has been the study of quasi stationarity of Markov processes, and how quickly this regime is reached. Having benefited over many years from several fruitful and enjoyable collaborations, I take great pleasure in presenting some of our most recent joint work in the area, beginning with some new historical perspectives.

Frank Coolen

University of Durham, United Kingdom

Discrete-time Markov chains - the work of Pauline (Coolen-)Schrijner

11.30 – 12.00

Abstract:

My wife Pauline completed her PhD thesis, entitled 'Quasi-stationarity of discrete-time Markov chains', under supervision of Erik van Doorn in 1995. This was also the start of a fruitful collaboration with Erik which continued until Pauline's untimely death in 2008. It is my pleasure to provide a brief overview of this collaboration, and to highlight further contributions by Pauline, in particular on Markov chains with imprecise probabilities. I will also provide a brief overview of the further work by Pauline, including with her 4 PhD students and with me. I will end with a brief introduction to some ideas which Pauline had started to consider and for which she had some initial results, but which are still waiting to be developed further.

Guy Latouche

Free University of Brussels, Belgium

The deviation matrix, Poisson's equation, and QBDs

13.15 – 13.45

Abstract:

The deviation matrix is closely related to the solutions of Poisson's equation and plays an important, if largely unsung, role in the analysis of Markov chains. Suffices to recall its connections to the sensitivity analysis of the stationary distribution of a Markov chain, and to the Central Limit theorem for Markov chains. If the state space is finite, then the deviation matrix is the group inverse of $I-P$ in discrete time, where P is the transition matrix; in continuous time, it is the group inverse of the generator. I shall focus on quasi-birth-and-death processes (QBDs) and I shall show how one may exploit the special transition structure of QBDs, and the physical interpretation of the deviation matrix, in order to obtain a computationally useful expression.

Bart van Arem

Technical University of Delft

Reducing randomness: the advent of self-driving cars

13.45 – 14.15

Abstract:

Worldwide, self-driving cars are believed to lead to a breakthrough in traffic flow efficiency and safety and driving comfort. However, there is a big gap between understanding the behaviour of an experimental self-driving and the ultimate implication of a large scale traffic systems based on manually and self-driven cars. The answer is in mathematical modelling. We will review current developments of self-driving cars, current modelling approaches and results and future challenges.

Rein Nobel

Free University of Amsterdam

The Downs-Thomson paradox revisited

14.15 – 14.45

Abstract:

A system of two parallel queues is considered. The first queue is a standard $M/G/c$ model and the second queue is an $M/G^{[N]}/\infty$ batch service queue with an unlimited number of servers. Each queue has its own arrival stream of dedicated customers, and there is a third arrival stream of general customers who upon arrival must decide which queue to join. In this presentation we will discuss the consequences for the overall mean sojourn times of the [general] customers of various selfish and social arrival policies. First the so-called user equilibria will be discussed, and we will show that the well-known Downs-Thomson paradox shows up when we increase the number of servers, *ceteris paribus*, i.e. keeping the mean service time constant in the $M/G/c$ queue, the overall mean sojourn time of the customers increases with the number of servers. Similar paradoxes show up when in the multi-server queue the squared coefficient of variation of the service time is changed. Also the optimal state-dependent selfish policy is calculated for which the Downs-Thomson paradox shows up in a more mitigated form. Next we will discuss several heuristic state-dependent selfish policies for the general customers which are more in accordance with practice than the optimal selfish state-dependent policy. It will turn out that also for these heuristic policies the Downs-Thomson paradox is present.

Werner Scheinhardt

University of Twente

Random walks in dependent random environments

15.15 – 15.45

Abstract:

Although the theoretical behavior of one-dimensional random walks in random environments is well understood, the numerical evaluation of various characteristics of such processes has received relatively little attention. In this talk we develop new theory and methodology for the computation of the drift of the random walk for various dependent random environments, including k -dependent and moving average environments. (Joint work with Dirk Kroese)

Erik van Doorn

University of Twente

Title: To be announced

15.45 – 16.15