Editorial

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Editorial

With this special issue we commemorate the fact that in 2023 it is one hundred years ago that Jacob Willem (Wim) Cohen was born.

Wim Cohen was born in Leeuwarden, The Netherlands, on August 27, 1923. After completing high school he spent a large part of World War II in hiding. During these years he acquired a deep knowledge of large parts of mathematics by self-study. After the war, he studied Mechanical Engineering at Delft University of Technology; in 1955 he also obtained a PhD in Mechanical Engineering, at the same university. After a few years as 'teletraffic engineer' in the Philips Telecommunication Group, Cohen was appointed Full Professor of Pure and Applied Mathematics at Delft University of Technology (1957–1973); from 1973 until 1988 he occupied the chair of Operations Research in the University of Utrecht. After his retirement he remained extremely active in research, right until his death in November 2000.

Cohen's research was at the boundary of stochastic operations research and applied probability, with a strong emphasis on queueing theory and its application to the performance analysis of computer- and communication systems. Methodologically he combined probabilistic methods and techniques from complex function theory, culminating in his magnum opus 'The Single Server Queue' [2]. This book set a standard of mathematical rigour which greatly enhanced the maturing of queueing theory as a mathematical discipline.

In his first Utrecht years he focussed on level crossings and also wrote a book on stochastic mean value theorems for regenerative processes [3]. This book contained, a.o., an elementary proof of the deep insensitivity result for the Erlang loss queue. In 1979 his attention was drawn to pioneering work of Fayolle and Iasnogorodski on solving two-dimensional queueing models via translation to a (Dirichlet, Riemann or Riemann–Hilbert) boundary value problem. His relentless efforts to develop this technique further, also under non-exponential assumptions, culminated in two books on the subject [4,5].

Cohen was one of the founding fathers of the *International Teletraffic Congresses* (ITC) and of the *Stochastic Processes and their Applications* conferences, and of the journal of the same name. He also organized several conferences on computer-communications performance, and was instrumental in promoting this topic in The Netherlands. Cohen was also one of the initiators of the Dutch national queueing colloquium. He received numerous honors and awards, including the AKZO prize from the Dutch Society of Sciences (1986), an honorary doctorate from the Technion (1988), and a Lifetime Achievement Award from the ITC (1997). More details about Cohen's life and research can be found in the obituary [1].

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Below we briefly mention the 13 papers in this special issue. **Fayolle, Franceschi and Raschel** show that the stationary distribution of reflected Brownian motion in a three-quarter plane can be found by solving a Riemann–Hilbert boundary value problem. Motivated by queueing applications, **Adan and Dimitriou** consider a class of two-dimensional random walks, the invariant measure of which can be written as a linear combination of product-form terms. They do so by adapting the conditions of the compensation approach, a technique that was earlier developed by Adan; Cohen had shed light on the relations between that approach and the boundary value technique. **Hoang, Raschel and Tarrago** show how the compensation approach may be applied to compute positive harmonic functions with Dirichlet boundary conditions.

Frostig and Perry and their PhD student **Kleiner** derive decomposition results for queues with server vacations. In the early eighties, as PhD students of the Technion in Haifa, Frostig and Perry attended several of Cohen's Technion lectures and summer courses. **Resing** (an MSc student of Cohen in 1986) together with **Núñez Queija** and **Prabhu** discusses an intriguing functional equation arising in Markovian queues with control of the server speed. **Boon and Van Leeuwaarden** (both 'scientific grandsons' of Cohen), together with **Janssen**, establish new heavy-traffic asymptotic results for the $G/G/1$ queue, applying Laplace transforms and complex-variable methods that are very much in the spirit of Cohen's work. **Borst**, another scientific grandson of Cohen, considers the stationary workload of queues with heavy-tailed characteristics. He adopts a transform perspective to illuminate a close connection between the tail asymptotics and heavy-traffic limits in infinite-variance scenarios. This paper is very much in line with Cohen's pioneering work on the topic in the late nineties (some of which remained unpublished after his death). **Boucherie** uses the cycle maximum of birth–death processes to characterize the asymptotic behavior of the maximum number of customers in single queues and in open Kelly–Whittle queueing networks. This is a topic on which Boucherie and Cohen had extensive discussions when they were both at CWI in the mid-nineties (as postdoc respectively as advisor). **Mitrani and Marin** tackle the problem of energy consumption by computers (Mitrani participated with Cohen in a European Basic Research project on parallel processors in the mid-nineties). They study a foreground–background queue with speed or capacity modulation, and provide an exact analysis of two different two-dimensional Markov processes. **Yechiali** (a long-time friend of Cohen) and his students Efrat and Nir Perel consider single-server multi-queue systems. They combine two disciplines to which Cohen made major contributions: join-the-shortest-queue and serve-the-longest-queue.

Kella and Löpker consider the notions of binomial thinning and binomial mixing, their interplay and associated limit theorems. **Zwart** (another scientific grandson of Cohen) and **Christianen, Janssen and Vlasiou** perform an asymptotic analysis of an Emden–Fowler type equation. It arises in a queueing theory context when modeling a queue of consumers (like electric vehicles) connected to the power grid. **Lakner and Reed** study the impulse control of Lévy processes under the infinite horizon discounted cost criterion. For an important example, the cash management problem, they provide a verification theorem of control band policies.

All papers were reviewed by two, sometimes three, referees. We are grateful to the referees for their insightful reports and to the authors for their valuable contributions. We believe that the end result provides a fitting tribute to a true scholar and exceptional scientist.

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