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In memoriam

Wim Cohen



Jacob Willem Cohen (1923–2000)

Jacob Willem (Wim) Cohen was born in Leeuwarden on August 27, 1923. After completing high school he spent a large part of World War II in hiding, with relatives and friends. During these years he acquired a deep knowledge of large parts of mathematics and physics by self-study. After the war, he studied mechanical engineering at Delft University of Technology. In 1949 he received his Master's degree (cum laude), and in 1955 he graduated cum laude, again at Delft University of Technology, with the Ph.D. Thesis *On Stress Calculations in Helicoidal Shells and Propeller Blades*. Just as Cohen's later work, his thesis research had a fundamental character, but was also directly related to practical applications.

During the period 1950–1957 Cohen worked as a 'teletraffic engineer' in the Philips Telecommunications group. In 1957 he was appointed to a chair of Applied Mathematics in the Mathematics Department in Delft.

In 1964 Wim Cohen married Annette Waterman, the daughter of a distinguished professor in chemical technology. She created an ideal atmosphere for research and scholarship, which enabled Cohen to undertake the immense task of writing *The Single Server Queue*, which was to become a landmark in Queueing Theory. One of its accomplishments is that it beautifully demonstrates the power of the method of Pollaczek in queueing theory. The method basically describes a physical queueing situation by analytic expressions (in terms of simple contour integrals), and thus transforms the probabilistic problem into a problem in complex analysis. The latter step was characteristic for much of Cohen's work: He was the generally acknowledged master of analytic methods in queueing theory.

On September 1, 1973, just after his fiftieth birthday, Cohen left his Alma Mater and moved to the Mathematical Institute of the University of Utrecht. Until his retirement in 1988 he stayed in Utrecht, devoting much of his energy to research and teaching. He was an inspiring teacher, who asked many interesting questions and blended mathematical rigour with probabilistic and physical intuition. It was extremely important to him that his students would get the proper guidance on the way to attaining their degree. Behind his somewhat formal three-piece suit appearance, he was a warm and friendly person who very much cared for his students. As an advisor of his Ph.D. students, he was unselfish and enormously stimulating.

Cohen's scientific curiosity and creativity seemed to increase over the years. During his first Utrecht years he was mainly concerned with level crossings and with stochastic mean value theorems for regenerative processes, culminating in the monograph *On Regenerative Processes in Queueing Theory*. Subsequently he became absolutely fascinated by a technique, developed by Fayolle and Iasnogorodski for the coupled processor model, to translate the problem of determining transforms of two-dimensional (queue length, workload) probability distributions into the problem of solving a (Dirichlet, Riemann, or Riemann-Hilbert) boundary value problem. Like the above-mentioned Pollaczek method, the idea was again to transform a probabilistic problem into a problem in complex analysis. Cohen's analytic power, stubborn tenacity and optimistic research attitude finally allowed him to develop a solution method for a large class of two-dimensional random walk and queueing models (like the shortest queue). The main

ideas were published in the book *Boundary Value Problems in Queueing System Analysis*, in 1992 followed by the monograph *Analysis of Random Walks*.

After his retirement, Cohen continued to be very actively involved in research, while being affiliated with CWI as an advisor. His last CWI report appeared in September 2000, when his health had very much deteriorated – as he expressed it: "The horizon has come nearer". J.W. Cohen passed away in the early morning of November 12, after a bravely carried illness. He was buried in Haifa, Israel, on November 14. He leaves behind his wife Annette and his son and three daughters, who all occupied such an important place in his life.

Cohen's contributions to Applied Probability, Stochastic Processes and Teletraffic were honoured in several ways. In 1986 the *Hollandsche Maatschappij der Wetenschappen* awarded him the AKZO prize. In 1988 he received an honorary doctorate from the Technion and became an honorary member of the International Advisory Committee of the Teletraffic Congresses.

His books and over 100 scientific papers, and his mixture of advanced analytical and probabilistic techniques with a sharp insight into the needs of teletraffic engineers and performance analysts, had a huge influence on the maturing of queueing theory as a discipline in applied probability. For his contributions, the queueing community will always owe him a debt. He felt at home in this community, counting many close friends among his colleagues.¹

¹ A more extensive report on the life and works of Professor J.W. Cohen will appear in the *Journal of Applied Probability*, Vol. 38 (2001).