

Ernesto de Queirós Vieira Martins (1945–2000):

An appreciation by Mário S. Rosa

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Professor Ernesto Q. V. Martins died suddenly in the Department of Mathematics of the University of Coimbra on the morning of November 8, 2000. Born on September 21, 1945, in a village near the city of Oporto, he did his secondary studies at the Liceu Alexandre Herculano (Porto), but chose the University of Coimbra for his undergraduate course studies.

It was around 1973–74, if my memory serves me right, and I had just arrived from the University of Birmingham (U.K.) after receiving my Ph.D. degree there, when I met Ernesto, an older and more mature student than the other students. Earlier, he had interrupted his studies to complete his compulsory military service (which included a mission in Angola) from July 1968 until November 1972. In those days, I lectured on various topics of mathematical programming, mainly linear programming and extensions—interesting tools for the course in operational research techniques. It was then that his attraction to optimization problems of this type began. In fact, his first paper was written while still an undergraduate, in his final year, with the Portuguese title “Fluxo de Valor Dado e Custo Mínimo—Algoritmo de Morton Klein” (“Flow of Given Value and Minimum Cost—Algorithm of Morton Klein”). It was this monograph that he submitted to fulfill the requirements to obtain his first degree (*Licenciatura*), one requisite at that time.

At the University of Coimbra, he completed the *Licenciatura* in Mathematics—Applied Mathematics—in July 1976 with the final average mark of 16 out of 20. His preference for network optimization problems became clear soon after the *Licenciatura*. In my view, the relative simplicity and the attractive practical performance of network simplex methods for the solution of minimum-cost flow problems provided, at that time, the main motivation for this attraction.

In October 1976, Ernesto obtained the position of assistant teacher in the Faculty of Science and Technology (FCTUC) and joined the CMUC—Center of Mathematics of the University of Coimbra—as a member of the research group on Numerical Analysis, Mathematical Programming

and Applications. In the meantime, he also began a deep and rigorous study of topics in computer science with an emphasis on algorithms and data structures; the aim was obviously the need to develop high-quality implementations of his algorithms for large-scale network problems.

In the academic year 1979–80, he was formally enrolled into the Ph.D. program under my supervision. He subsequently received leave from teaching for the two academic years 1982–83 and 1983–84, intensifying his research work during that period. Ernesto concluded the studies that formed the basis of his Ph.D. thesis, in the field of operational research, with the Portuguese title “Determinação de Caminhos Óptimos em Redes Orientadas” (“Determination of Optimal Paths in Directed Networks”); he defended the dissertation in Coimbra on December 4, 1984, and achieved the distinction *summa cum laude*. He was an assistant professor at that time and became an associate professor on February 26, 1988, and took the examination to qualify as full professor (*agregação*) on September 24, 1999, receiving unanimous approval. He had applied for the position of full professor (*professor catedrático*) just a few months before his heart put an end to his life.

His area of scientific interest was operations research, and within this area, Prof. Ernesto’s works were related to network flow or network optimization problems such as minimum-cost flow, maximum flow, shortest paths, multiobjective shortest paths, and K -shortest path problems. His computational expertise gave him a unique ability to develop and implement algorithms to solve network problems with quite a large number of nodes and arcs. His published papers (a list of the most significant ones is presented at the end of this article), as well as his active participation and presentation of results at various national and international conferences and meetings, had an important impact on the development of research on those subjects.

Ernesto Martins dedicated considerable effort to elaborating and updating his personal web page, <http://www.mat.uc.pt/~eqvm>, which has provided a great service to researchers in network optimization seeking a variety of resources. This page summarizes his research activity, citing not only his published papers, seminars, and conference participation, but also recent results obtained in subjects such as

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- Shortest path ranking problems,
- Multiobjective optimal path problems,
- Minimum-cost and maximum-flow problems.

One can also find links to *bibliographies* on a variety of optimization topics, upcoming *conferences*, as well as *electronic journals* and *research reports*. This page also contains pointers to a number of *network programming courses* and provides an extensive list of optimization codes in the public domain (*source codes*). In this latter category, one can find his own network optimization and random network generator codes written in Fortran 77. Additional links are collected for various optimization sites, as well as a listing of home pages for active network researchers, mathematical societies, and *Fortran tutorials*. In the section concerning his personal life, we can find references to Ernesto's *favorite sports*, *personal data*, and the East Timor cause (*pictures from Timor*).

Ernesto Martins was also extremely active in refereeing for the following journals: *Portugaliae Mathematica*, *Investigação Operacional*, *European Journal of Operational Research*, *Networks*, *Opsearch—the Indian Journal of Operations Research*, *International Transactions in Operations Research*, *Discrete Applied Mathematics*, *Journal of Optimization Theory and Applications*, and *Computers & Operations Research*. He served as a reviewer for *Mathematical Reviews* from March 1985 until January 1991. In addition, he was a member of the editorial committee of the journal *Investigação Operacional* and a member of the Portuguese Society of Mathematics as well as the Portuguese Association of Operations Research (APDIO).

Ernesto lectured on various subjects for undergraduate courses (such as operational research, informatics, introduction to computers and programming, linear programming, discrete optimization) and also for M.Sc. courses (such as discrete network optimization, multiobjective network optimization, and various seminars). He was a teacher who enjoyed an excellent relationship with his students due not only to his pedagogical style but also to his human qualities. He had supervised seven M.Sc. students and was supervising three Ph.D. students on their theses.

His joyfulness for living and his enthusiasm at work were well known within the academic community in our department. Earlier, as an amateur sportsman, he ran various mid-marathons until December 26, 1992, the day when his heart strongly advised him to avoid that kind of sport he liked so very much. From then on, his favorite sport became fishing.

At the beginning of September 1999, after telling me all about his visit to Havana (Cuba) along with his participation at the 4th International Conference on Operations Research, Ernesto conveyed to me his diligence about planning, together with his Ph.D. students José Luis, Marta Pascoal, and Deolinda Dias, a session to be prepared by them on their recent work—which was to be presented at the Optimization 2001 Conference in Aveiro (Portugal).

We congratulate Professor Douglas Shier who organized

and chaired the special session in honor of Ernesto Martins which took place on July 23, 2001, at the Optimization 2001 Conference at the University of Aveiro. We were there and I personally felt emotionally the recognition of a person who became, as well as a colleague, a friend in whose company I had spent many pleasant moments. I must confess that it was with some apprehension that I approached writing a dedication for this special issue of *Networks* in honor of Ernesto Martins—yet I must also confess that I felt that I should do it, after the invitation Professor Shier offered me. Many people will miss Ernesto Martins not only because of the fact that he is no longer contributing to meetings, articles, and the problem-solving activities which he liked most, but those of us fortunate to have known him will remember a kind, generous, cordial, and good-humoured man.

We congratulate also the editors of *Networks* in preparing this special issue of the journal in honor of Ernesto Martins. The contributors to this issue, friends and colleagues, were all connected in one way or another to Ernesto and his work.

Ernesto Martins leaves behind his wife Dr. Acília Fátima Lopes Martins and their son Dr. Nuno Lopes Martins who recently finished his *Licenciatura* in mathematics at the University of Coimbra.

Additional references:

- “Prof. Doutor Ernesto Martins (1945–2000),” by Prof. Doutor Jorge António Sampaio Martins, Presidente do Conselho do Departamento de Matemática de FCTUC, in *Informação Universitária—Revista Trimestral da Universidade de Coimbra*, Dezembro 2000.
- “O Trabalho do Professor Ernesto Q.V. Martins,” by Mário S. Rosa, Departamento de Matemática da FCTUC, Universidade de Coimbra, in *Boletim da APDIO*, no. 34, Abril, 2001; Editor João Paulo Costa.

PUBLICATIONS OF PROFESSOR ERNESTO MARTINS

- [1] A dual algorithm for the minimal cost flow problem, *Port Math* 38 (1979), 155–165.
- [2] A bicriterion shortest path algorithm, *Eur J Oper Res* 11 (1982), 399–404 (with J.N. Clímaco).
- [3] An algorithm for ranking paths in acyclic networks, *Oper Res Spekt* 5 (1983), 87–90.
- [4] An algorithm to determine a path with minimal cost/capacity ratio, *Discr Appl Math* 8 (1984), 189–194.
- [5] On a multicriteria shortest path problem, *Eur J Oper Res* 16 (1984), 236–245.
- [6] On a special class of bicriterion path problems, *Eur J Oper Res* 17 (1984), 85–94.
- [7] An algorithm for ranking paths that may contain cycles, *Eur J Oper Res* 18 (1984), 123–130.
- [8] An algorithm for the maximal multicommodity funnel-node

- flow in an undirected network, *Oper Res* 33 (1985), 537–547 (with Mário S. Rosa).
- [9] On a particular quadratic network flow problem, *Eur J Oper Res* 29 (1987), 317–327.
- [10] An algorithm for the multiobjective shortest path problem on acyclic networks, *Invest Oper* 11 (1991), 52–69 (with J.A. Azevedo).
- [11] An algorithm for the ranking of the shortest paths, *Eur J Oper Res* 69 (1993), 97–106 (with J.A. Azevedo, M.E. Costa, and J.J. Madeira).
- [12] A computational improvement for a shortest paths ranking algorithm, *Eur J Oper Res* 73 (1994), 188–191 (with J.A. Azevedo, J.J. Madeira, and F.M. Pires).
- [13] An algorithm for the quickest path problem, *Oper Res Lett* 20 (1997), 195–198 (with J.L. Santos).
- [14] Optimal cutting directions and rectangle orientation algorithm, *Eur J Oper Res* 109 (1998), 660–671 (with A.M. Almeida and M.R. Rodrigues).
- [15] The optimal path problem, *Invest Oper* 19 (1999), 43–60 (with M.M. Pascoal, D.M. Dias, and J.L. Santos).
- [16] Deviation algorithms for ranking shortest paths, *Int J Found Comput Sci* 10 (1999), 247–261 (with M.M. Pascoal and J.L. Santos).
- [17] A new shortest paths ranking algorithm, *Invest Oper* 20 (2000), 47–61 (with J.L. Santos).
- [18] A new improvement for a K shortest paths algorithm, *Invest Oper* 21 (2001), 47–60 (with M.M. Pascoal and J.L. Santos).
- [19] Solving bicriteria 0–1 knapsack problems using a labeling algorithm, *Comput Oper Res* (with M.E. Captivo, J.N. Clímaco, J.R. Figueira, and J.L. Santos) (to appear).