Alexei V. Pokrovskii — in memorium

2 June 1948 – 1 September 2010

Alexei Vadimovich Pokrovskii was an outstanding mathematician, a scientist with very broad mathematical interests, and a pioneer in the mathematical theory of systems with hysteresis. He died unexpectedly on September 1, 2010 at the age of 62. For the previous nine years he had been Professor of Applied Mathematics at University College Cork in Ireland.

The main body of Alexei's work centred on nonlinear dynamical systems including systems with hysteresis, discontinuous and nonsmooth systems, control theory, nonlinear functional analysis and applied mathematical modelling. However, the remarkable diversity of his research was broader and included, at different stages of his work, contributions to game theory, stochastic systems, complexity and general functional analysis. He had a particular penchant for combinatorial and probabilistic methods, which appeared repeatedly throughout his many publications. In 1983 he was awarded the prestigious Andronov prize by the USSR Academy of Sciences.

Alexei was born in Voronezh, a city in Central Russia about 500 kilometres south of Moscow. His family had long standing connections with medicine, but Alexei's outstanding mathematical talents were apparent very early. In fact, he already published his first paper as a teenager. He attended the Voronezh State University in 1966–1971, where he received his BSc and MSc degrees in mathematics. He completed his equivalent of a PhD in 1974 under the supervision of Mark Alexandrovich Krasnosel'skii, one of Russia's foremost mathematicians at that time and founder of a famous mathematical school of Nonlinear Functional Analysis. He moved with Krasnosel'skii to the Institute for Control Problems of the Russian Academy of Sciences in Moscow, where Krasnosel'skii's group began systematically to investigate the mathematical foundations of hysteresis. Alexei played an important role in this development, a milestone of which was the publication of the very influential monograph *Systems with Hysteresis* (M.A. Krasnosel'skii and A.V. Pokrovskii, Springer, 1989).

The collapse of the Soviet Union was a very difficult period for scientists there and, like many of his colleagues, Alexei left Russia. He spent the years 1992 to 1997 in Australia on various research grant funded positions with Phil Diamond in Brisbane and Peter Kloeden in Geelong. This Australian period was very productive resulting in around 50 publications on nonlinear dynamics, especially the robustness of the dynamics of chaotic systems under discretisations, which led to development of new mathematical tools such as semi-hyperbolicity and bi-shadowing on the basis of topological degree theory. This culminated in the publication of the electronic monograph *Semihyperbolicity and Bishadowing* (P.M. Diamond, P.E. Kloeden, V. Kozyakin and A. Pokrovskii, e-book, AIMS, 2012) (downloadable free of charge from http://aimsciences.org/books/rcd/rcdVol1.html).

Although Alexei did not have the security of tenure in Australia, the time spent there was, nevertheless, a happy time for him and his family. Alexei cultivated and enjoyed a collective way of doing research, which is apparent from his publications. He had a talent to identify and consolidate interests of his colleagues and involve them in joint research projects. At the same time, he was invariably interested in the research done by others and truly enthusiastic about their achievements and success. Given his method of work, the huge number of collaborators that Alexei had comes as no surprise. In particular, many Russian colleagues of Alexei visited Australia and enjoyed the welcoming warm hospitality of Pokrovskii's family. They included N.A. Bobylev, V.A. Bondarenko, M.L. Kleptsyna, V.S. Kozyakin, A.M. Krasnosel'skii, N.A. Kuznetsov, B.N. Sadovskii, A.A. Vladimirov and I.G. Vladimirov.

In 1997 Alexei moved to Cork, to be closer to European centres of mathematical research, especially, to centres of active 'hysteretic life'. At first, he had an untenured research position, but his talents quickly became apparent and he was offered a full profesorship in applied mathematics. In Cork, Alexei maintained the momentum of his research activities in Australia, although now burdened with academic adminstration. He enjoyed modelling as much as analysis and valued collaboration with colleagues from other disciplines, finding it both interesting and stimulating. Research themes at this time included modelling hysteresis in macroeconomics, soil-water hysteresis in hydrology, epidemics and seasonal dynamics of wild bird populations, canard solutions and chaos in nonsmooth singularly perturbed systems, bifurcations, and chaos in systems with Preisach hysteresis operator, just to name some.

Alexei's charisma was irresistible. He was incredibly imaginative and infinitely rich in ideas, he was absolutely generous in sharing them with others. In his obituary for Alexei in the *Irish Times* (16 October 2010), Professor Finbarr Holland wrote

> He had a child-like curiosity and wonderment for the scientific world, a deep knowledge of several disparate areas which, combined with a penetrating mind, enabled him to make significant progress in whatever problem that took his interest. But he also took a keen interest in other people's work, and whenever somebody shared a surprising new fact with him, his countenance would alter, his eyes would sparkle with delight, and one would get the 'thumbs up', signifying his pleasure. Such a response was very encouraging to the person sharing the information,

especially to a young researcher, still unsure of his or her own ability. He was immensely generous with his time and talents, and warm-hearted in attributing to others ideas that were very often his alone, qualities which endeared him to his students. In truth, he was a polymath of the first rank.

Alexei was indeed an outstanding mathematician with a very special way with people. He was loved by everyone who knew him and is sadly missed by all. His wife Natasha works at the Tyndall National Institute in Cork. His daughter Olya returned to family tradition to study medicine and is now specializing in ophthalmology. Alexei's son Alexei Jr. continues in his father's footsteps, first taking his degree in mathematics at the University of Cambridge and now doing a PhD in graph theory at the London School of Economics.

A special memorial issue of the journal *Discrete & Continuous Dynamical Systems, Series B,* dedicated to Alexei will be published this year.

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