PREFACE

Alexei V. Pokrovskii (02.06.1948 – 01.09.2010)

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 62. For the previous nine years he had been Professor and Head of Applied Mathematics at University College Cork in Ireland.

The main body of Alexei's work was 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. He already published his first paper as a teenager. He attended the Voronezh State University, 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

M. A. Krasnosel'skii, A. V. Pokrovskii, *Systems with Hysteresis*, Nauka, Moscow (1983), English translation Springer (1989).

Alexei spent the years 1992 to 1997 in Australia on various research grant funded positions with Phil Diamond in Brisbane and Peter Kloeden in Geelong. 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. 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 (downloadable free of charge from http://aimsciences.org/books/rcd/rcdVol1.html)

P. M. Diamond, P. E. Kloeden, V. Kozyakin and A. Pokrovskii, *Semihyperbolicity and Bishadowing*, e-book, AIMS (2012).

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 professorship in applied mathematics. In Cork Alexei maintained the momentum of his research, simultaneously devoting a lot of time to the supervision of his students, although now burdened with academic administration. He enjoyed modelling as much as analysis and cultivated collaborations with colleagues from other disciplines-engineers, physicists, biologists, economists. Research themes at this time included modelling hysteresis in macroeconomics and finance, soil-water hysteresis in hydrology, dynamics of epidemics, canard solutions and chaos in non-smooth singularly perturbed systems, just to name some. He made Cork a home of the international conference series on Hysteresis and Multi-rate Processes.

Alexei's charisma was irresistible. His thinking was incredibly imaginative and infinitely rich in ideas, and he was absolutely generous in sharing them with others. In his obituary for Alexei in the in *Irish Times* (October 16, 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."*

Alexei was indeed an outstanding mathematician, with a very special way with people. He was loved by his colleagues, his students and 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.

<div align="right">

Martin Brokate
Phil Diamond
Peter Kloeden
Alexander Krasnosel'skii
Pavel Krejčí
Dmitrii Rachinskii

</div>