BOOK OF ABSTRACTS
Applied Stochastic Models and Data Analysis
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Plenary and Keynote Talks

Biodemography of mortality and longevity

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There is growing interest in scientific explanations of aging and in the search for a general theory that can explain what aging is and why and how it happens. There is also a need for a general theoretical framework that would allow researchers to handle an enormous amount of diverse observations related to aging phenomena. Theoretical analysis of systems failure in aging leads naturally to apply the already existing general theory of systems failure, which is also known as the reliability theory. This lecture reviews existing theoretical reliability models and approaches, which help to understand the mechanisms and age-dynamics of systems failure. Empirical observations on systems failure in aging are also reviewed (the Gompertz and Weibull mortality laws, the compensation law of mortality, and the late-life mortality levelling-off), and are theoretically explained through the observed decline in system's redundancy with age. It is shown that redundancy is a key notion for understanding aging, and the systemic nature of aging in particular. Living organisms seem to be formed with a high load of initial damage, and therefore their life span and aging patterns may be sensitive to early-life conditions that determine this initial damage load during early development. Aging is a complex phenomenon, and a holistic approach using reliability theory may help analyze, understand, and, perhaps, control it.

Additional reading:
Gavrilov LA, Gavrilova NS. Models of Systems Failure in Aging. In: P Michael Conn (Editor): Handbook of Models for Human Aging, Burlington, MA: Elsevier Academic Press, 2006. 45-68. ISBN 0123693918

Full text available at:
http://longevity-science.org/Failure-Models-2006.pdf

Identification of a Simple Homeostasis Stochastic Model Based on Active Principle of Adaptation

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The Active Principle of Adaptation for linear time-invariant state-space stochastic MIMO filter systems is applied to human body temperature daily variation adaptive stochastic modeling.
Keywords: Adaptation, active principle, homeostasis, parameter estimation, stochastic modeling, thermoregulation.

The distorting death causes structure of Russian population

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The analysis of codes of death causes was conducted on the base of official mortality database of 2010. The next factors distorting death causes structure of working population have been revealed: the factors which lead to unsatisfactory quality of diagnostics of death causes in total (insufficient frequency of post-mortem examinations; there is no opposition to over the frequent use of unspecified causes among medical community; lack of control of errors in analysis of logic of development lethal disease; lack of examination of patients before their deaths; low qualification of medical specialists in the sphere of death causes coding): the main factors which lead to worsening of quality of mortality statistics from external causes (unsettled legal framework; tendency in forensic medical practice to use the codes R96-R99 instead of Y10-Y34; non-compliance to unified standards of death causes coding among all Rus! sian regions); the obstacles hindering objective registration of alcoholic component of mortality including cardiovascular diseases (establishment of alcohol-related diagnosis together with narcologist only: long-standing practice of establishing of alcohol-related diagnosis only when there is no other alternative; filling of the line in death medical certificate “other important conditions which contributed death” is not obligatory).
Keywords: quality of mortality statistics; reliability of reduction of mortality from external causes; reliability of growth of cardiovascular mortality; unspecified diagnosis; underlying death cause.