ABSTRACT: This presentation deals with a systematic mathematical treatment of how to solve the problem of feedback and feed-forward goal-oriented control under obstacle avoidance for a team of controlled motions. This includes related problems of feedback team control and motion planning under obstacles and collision avoidance. It covers topics from basic theoretical problems to recommended computational methods. The novelty of the approach lies in treating controlled team motions as lying in a reconfigurable virtual container (shell) that moves towards the target set avoiding both external obstacles (static or dynamic) and internal collisions within the container. The suggested solution schemes rely on combining variational methods of nonlinear analysis and analytical mechanics, including Hamiltonian techniques, with those of set-valued calculus and minimax approaches, as well as on progressive modification of earlier developed computational tools.

Bio: Professor Kurzhanski was elected Associate Member of the Russian (former Soviet) Academy of Sciences in 1981 and Full Member in 1990. He is the Chairman of the Russian National Committee on Automatic Control (the IFAC NMO), Council Member of IFAC – the International Federation for Automatic Control, (2005-2011). Member of Advisory and Editorial Boards for monograph Series: Springer – “Lecture notes in Control and Information Sciences”, Birkhauser – “Systems & Control : Foundations and applications” and an array of scientific journals on applied mathematics, control and system analysis. His research interests and achievements are in the field of estimation and control under incomplete (realistic) information, control of complex systems, new dynamic programming techniques, distributed and multi-agent control, inverse problems of mathematical physics, numerical methods and set-valued techniques in dynamics, control and mathematical modeling for applied systems analysis.