Research Interests

- Characterizations for the existence of an extension of a linear operator, bounded from above by a given convex operator P, and bounded form below by a given concave operator Q, P and Q being defined on arbitrary convex subsets of a real vector space. As a particular case (when one of these subsets is a convex cone), one can obtain generalizations of some classical results of H. Bauer, I. Namioka, H. Schaefer (see [1], [5], [56]). Some other generalizations of Hahn-Banach type results are derived. Such type results on preordered linear spaces lead to solutions of two abstract moment problems, one of them being a Markov-type moment problem for linear operators. The other one is also a moment problem with two constraints, the "dominating" operator P being convex ([7]).

- Elements of theory of topological ordered vector spaces, applied to concrete spaces of functions and self-adjoint operators.([1]-[3], [5]-[9], 13]-[19], [21]-[44], [55]-[62]).

- Applications of the solutions of the two abstract moment problems from [7] to some classical Markov-type moment problems (including Markov moment problems on unbounded, non-semialgebraic subsets of R^n ([39])). A determinate classical Markov moment problem on an unbounded intervals ([39]) and subsets of R^n ([62]). Operator-valued Markov-type moment problems ([26], [28], [34], [38], [43], [59], [62]).

- A "construction" of the global inverse of a "strictly monotone" convex operator ([8]), with applications to the construction of the "strictly decreasing" solution of an operatorial equation, formulated implicitly ([25], [33], [36], [37], [40],.[42]). The implicit function theorem for complex-differentiable functions.

- Some integral formulae, with an application to approximation theory, and further applications to the Markov moment problem on $[0, \infty)$.

- Applications to the solutions of the abstract moment problems solved in [7] to concrete moment problems in spaces which are not related to polynomials ([13], [14], [19], [23]).

- Other sandwich-type theorems, on unbounded finite-simplicial convex subsets ([28], [29], [59]).

- Applications of the classical Hahn-Banach principle to some Markov-type moment problems and to some geometric aspects of the optimization general theory ([11], [32]).

- Elements of uniform approximation of continuous functions on $\mathbf{R}^n$ by $C^{\infty}-\sigma$-step functions ([12]).

- Elements of convex analysis ([2], [9]).

- An implicit function theorem for convex (not necessarily differentiable) functions, in which the "unknown function" can be "constructed" and it is "globally" defined ([9]).

- Some applications of elementary analysis to algebra and arithmetic ([24]). The fact that some numbers are not integers ([24]), and, on the other hand, that some functions constructed in [33], [37], [60] do not apply (except for a few cases) primes into primes, or integers into integers.

- Variants of Newton's method for convex "strictly monotone" operators, with applications to concrete equations, when the "unknown" is a self-adjoint operator. When the equation is linear (having operator coefficients), its solutions lead to a solution of the corresponding linear homogeneous differential equation (via the exponential function, as in the scalar case).

- Elementary inequalities, Jensen-type inequalities related to the Gamma function and to the moment problem. Some of these inequalities lead to the compactness of some subsets of $\mathbf{R}^n$ ([27], [28]). Inequalities involving self-adjoint operators, which characterize (or only imply) the existence of some solutions of some operator-valued Markov-type moment problems ([38], [39]).

- Topology and its connections to other fields.

- Applications of the calculus of variations ([44], [45]), and 3) from “Other conference presentations”.

- Applications of optimization and approximation theory to kinematics, differential equations and dynamical systems ([43], [45], [46], [47]).