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Ivo G. Rosenberg's Special Issue

Miguel Couceiro, Maurice Pouzet, Lucien Haddad

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PREFACE TO IVO G. ROSENBERG'S SPECIAL ISSUE

This first volume is dedicated to the memory of the late Professor Ivo G. Rosenberg (1934-2018) that is missed and recalled by the universal algebra and multiple valued logic communities not only as one of the greatest mathematicians of our time, but also as a wonderful human being.

It is made of the following seven contributions that cover some of the many research interests of Ivo that include finite and infinite posets, lattices, tolerances, combinatorial properties of finite sets, matrices over lattices, and quasigroups and semigroups.

The first, *The mathematics of Ivo Rosenberg*, is a brief survey by the editors that makes a short presentation of some of the main contributions of Ivo.

The second, *On better-quasi-ordering classes of partial orders* is by G. McKay and discusses some classes of (partially) ordered sets quasi-ordered by embeddability. The theory of better-quasi-orders (b.q.o) of Nash-Williams as been recognized as the tool for proving that classes of infinite structures can be well-quasi-ordered by embeddability. Some classes satisfy a strengthening of this notion, there are well-behaved according to Miller, Van Engelen and Steel (1987). The author builts on this notion to prove that some classes of ordered sets are well-quasi-ordered by embeddability. His results extend those of Laver, Corominas and Thomassé.

The third, *Semimodular λ-lattices*, is by I. Chadja and H. L'anger and explores a generalization of lattices introduced by Snasel (1997), and Kopitov and Dimitrov,(1998). Every poset in which every pair of element has an upper bound and a lower bound can be endowed with two operations making it a λ-lattice. Some non-classical logics use posets rather than lattices, whereas in computer science, semimodularity for posets is the strong confluence in rewriting systems. The use of λ-lattice allows us to treat posets in these areas as algebras and to apply methods of Universal algebra.

The fourth, *Permuting 2-uniform tolerances on lattices*, is by G. Czedli and studies the so called "2-uniform tolerances". He characterizes pairs of such tolerances on lattices of finite length, and shows that any two 2-uniform congruences on such lattices commute.

The fifth, *A finite intersection theorem*, is by P. Frankl and it revisits some results by the author and Ivo. The author conveys a warm remembrance he has of Ivo Rosenberg. He gives a stunning proof of a theorem of finite sets by Ivo and himself (1981). This proof is noteworthy. In order to prove the inequality $m(n, k, L) \leq n$, the author associates to a family $\mathcal{F}$ the collection of characteristic vectors of members F of $\mathcal{F}$, and using scalar product he proves that these vectors are linearly independent. Hence their number is at most n. In addition the author states a conjecture and a special case.

The sixth, *Multiplication of matrices over lattices*, is by K. Kátai-Urbán and Tamás Waldhauser and investigates properties of $n \times n$ matrices over lattices, following the tracks of many studies since the 1970's. In particular, the authors show

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that matrix multiplication over nondistributive lattices is antiassociative, and determine the invertible matrices under some natural conditions.

The last contribution, *Quasigroup words and reversible automata*, is by J.D.H. Smith and S.G. Wang and where they relate algebraic aspects underlying quasigroups with reversible automata. More precisely, the authors establish links between reversible automata as introduced by Gvaramiya and Plotkin, with the linearization of certain quasigroups.

We wish to sincerely thank all authors that devoted considerable time and effort to prepare comprehensive works that cover a great deal of Ivo G. Rosenberg's research interests, and that greatly contribute to the memory of Ivo. We also need to acknowledge the work by the many selected reviewers that agreed to carefully and thoroughly review these contributions, and that provided great insights and most valuable suggestions.

Nancy, France — Miguel Couceiro
Kingston, Ontario, Canada — Lucien Haddad
Lyon, France — Maurice Pouzet