INSTITUTUL DE MATEMATICĂ "SIMION STOILOW" AL ACADEMIEI ROMÂNE

Conferința lunară

New computable invariants for a pair of a compact space and a real or angle -valued map, based on homology

Dan Burghelea

(*Ohio State University*)

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Abstract: In finite dimensional linear algebra, to a system (V,T), V a finite dimensional complex vector space and T a linear map, one associates the collection of eigenvalues of T, and to each eigenvalue the generalized eigenspace of dimension the multiplicity of the root.

In analogy with the above, to a pair (X,F) as in the title, an arbitrary field and nonnegative integer r, one associates a finite collection of complex numbers with multiplicity (the homological eigenvalues) of total cardinality the Betti number in dimension r, and to each such complex number a vector spaces (the homological eigenspace). The direct sum of these vector spaces is isomorphic to the homology in dimension r with coefficients in the field.

As in the linear algebra these new invariants are computable by effective implementable algorithms, satisfy robustness and enjoy (Poincaré) duality when X is a manifold. They permit the reconstruction of some of the topology of the underlying space.

Their study generates a new class of problems in topology of some relevance both inside mathematics (dynamics) and outside mathematics (data analysis).