HOMOMORPHISM-HOMOGENEOUS ORDERED STRUCTURES

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In 2006 P. J. Cameron and J. Nešetřil introduced a relaxed version of homogeneity: we say that a structure is homomorphism-homogeneous if every homomorphism between finitely generated substructures of the structure extends to an endomorphism of the structure.

In this talk we consider homomorphism-homogeneous posets as relational structures, and then consider homomorphism-homogeneous lattices and semilattices understood as algebras. We present the characterization of homomorphism-homogeneous posets (as relational systems) and homomorphism-homogeneous lattices (as algebras), and then provide several classes of homomorphism-homogeneous semilattices (as algebras) and several classes of semilattices which are not homomorphism-homogeneous.

The full characterization of homomorphism-homogeneous semilattices is still an open problem.

Finally, the classification of finite homomorphism-homogeneous digraphs relies on the classification of homomorphism-homogeneous structures (A, ρ) with one binary relation whose reflexive closure $(A, \rho \cup \{(a, a) : a \in A\})$ is a partially ordered set. This is also an open problem.

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