Injective homomorphisms of directed graphs

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Abstract

A homomorphism from a digraph $D$ to a digraph $H$ is called injective if it is injective on the in-neighbourhood of each vertex. Complexity results for injective homomorphisms of irreflexive digraphs $D$ are considered in the case when the target digraph $H$ is reflexive, and in the case where the target graph $H$ is irreflexive. A dichotomy theorem is obtained in the case where $H$ is reflexive, whereas such a theorem in the case where $H$ is irreflexive would imply one for all digraph homomorphism problems. The complexity of the related injective oriented chromatic number problems (the minimum $n$ for which a digraph $D$ admits an injective homomorphism to a digraph on $n$ vertices – defined together with A. Raspaud) is also discussed.