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Isomorphism problems for Hopf-Galois structures and skew braces

Let L/K be a finite Galois extension of fields and let $\mathcal{S}$ denote the set of Hopf-Galois structures on L/K. Each Hopf-Galois structure in $\mathcal{S}$ consists of a Hopf algebra H and a certain K-linear action of H on L; a natural way to partition $\mathcal{S}$ is to identify Hopf-Galois structures whose underlying Hopf algebras are isomorphic. On the other hand, each of these Hopf-Galois structures corresponds to a skew brace; another way to partition $\mathcal{S}$ is to identify Hopf-Galois structures whose corresponding skew braces are isomorphic. We use the interplay between these two partitions of $\mathcal{S}$ to study the Hopf algebras and skew braces involved. In particular, we show that in some cases the isomorphism class of the Hopf algebra giving a Hopf-Galois structure is determined by the corresponding skew brace. This is joint work with Alan Koch (Agnes Scott College).