1079-12-182 **Lindsay N. Childs*** (lchilds@albany.edu). *Fixed point free pairs of homomorphisms and Hopf Galois structures.*

Given finite groups Γ and G of order n, it is known that regular embeddings from Γ to the holomorph of G yield Hopf Galois structures on a Galois extension $L|K$ of fields with Galois group Γ given by K-Hopf algebras H whose associated group is G. We consider regular embeddings that arise from fixed point free pairs of homomorphisms from Γ to G. When Γ and G are isomorphic and one homomorphism is the identity, then regular embeddings arise from fixed point free endomorphisms of G, an approach that, for example, yields all regular embeddings from S_n to $Hol(S_n)$ for $n > 6$. If G is a complete group, then all regular embeddings from Γ to G arise from fixed point free pairs. We compute some examples. Kohl (1997) proved that if p is an odd prime and Γ is a cyclic group of order p^n, then every Hopf Galois structure on a Galois extension of fields with Galois group Γ has associated group Γ, and hence is abelian. Using fixed point free pairs, we prove that if p is an odd prime and Γ is a non-cyclic abelian p-group of order p^n, $n \geq 3$, then $L|K$ admits a non-abelian Hopf Galois structure. (Received January 11, 2012)