

Robert F. Morse, University of Evansville. "Computing the nonabelian tensor square of finitely presented groups."

Abstract: The nonabelian tensor square of a group G is the group generated by the symbols $g \otimes h$, for all g, h in G subject to the relations $gg' \otimes h = ({}^g g' \otimes^g h)(g \otimes h)$ and $g \otimes hh' = (g \otimes h)({}^h g \otimes^h h')$ for all g, g', h, h' in G and where ${}^a b = aba^{-1}$ (conjugation on the left). For finitely presented nilpotent groups, the nonabelian tensor square is a finitely presented group. In this talk, we will outline a method for computing the non-abelian tensor square of such groups using cross pairings. A cross pairing is a function $\Phi : G \times G \rightarrow L$ which determines a unique homomorphism of $\Phi^* : G \otimes G \rightarrow L$. Our method involves conjecturing an L and Φ and showing that Φ^* is an isomorphism. This method can be successfully managed if L is known to be abelian as in the case of groups of nilpotency class 2. If L is not commutative, conjecturing L and checking the cross pairings are significantly more difficult but can be done with computer assistance. Our example to illustrate this technique will be computing the nonabelian tensor square of the free 2-Engel group of rank 3 following Bacon, Kappe and Morse (1997).