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Tim Hsu (tim.hsu@sjsu.edu), **Hang Lu Su*** (hanglu.su@mail.mcgill.ca) and **Olga Zamoroueva** (olgazamorueva@yahoo.com). *Computation in the completion of the free group algebra*. Preliminary report.

It is known (e.g., due to independent results of Malcev and B.H. Neumann) that $\mathbf{Q}[F_n]$, the (rational) group algebra of the free group of rank n , can be embedded in a division algebra D . We consider the problem of making this embedding algorithmic.

More precisely, if D_0 is the smallest sub-division algebra of D containing $\mathbf{Q}[F_n]$, we consider the problem of representing elements of D_0 by a finite data structure with which the algebra operations (addition, multiplication, inversion) can be calculated algorithmically. We present a solution to this problem on a particular subalgebra of D_0 , using noncommutative formal power series with recurrence relations, and discuss how to generalize this idea to all of D_0 . We also discuss applications of our results to problems in algebraic topology. (Received September 22, 2015)