1056-13-1705 **Shuhong Gao*** (sgao@clemson.edu), Dept of Mathematical Sciences, Clemson University, Clemson, SC 29634, and **Yinhua Guan** (GGuan@CLEMSON.EDU), Dept of Mathematical Sciences, Clemson University, Clemson, SC 29634. *New Algorithm for Computing Grobner bases.*

Efficient computation of Grobner bases for systems of polynomials is a major challenge in computational algebra and its applications. Buchberger's algorithm was introduced in 1965, and there have been extensive efforts in improving its efficiency since then. Remarkable recent works include F4 (Faugere 1999), XL (Courtois et al. 2000), F5 (Faugere 2002), and their improvemets MutantXL (Ding et al. 2008) and F5C (Eder and Perry 2009). These algorithms have solved many large systems of polynomials thathad defied previous algorithms.

In this talk, we present a new algorithm for computing Grobner bases. Our algorithm is incremental just like the F5 algorithm. At a typical step, one is given a Grobner basis G for an ideal I and another polynomial h, it is desired to compute a Grobner basis for the new ideal (I,h), obtained from I by joining h. Let I:h denote the colon ideal of I divided by h. Our algorithm computes Grobner bases for (I,h) and I:h simultaneously. In previous algorithms, S-polynomials that reduce to zero are useless, in fact, F5 tries to avoid such reductions as much as possible. In our algorithm, however, these "useless" S-polynomials give elements in I:h and are useful in speeding up the subsequent computation. (Received September 22, 2009)