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**Dennis Moore\*** ([d.k.moore@uky.edu](mailto:d.k.moore@uky.edu)), Department of Mathematics, 715 Patterson Office Tower, University of Kentucky, Lexington, KY 40506, and **Uwe Nagel** ([uwe.nagel@uky.edu](mailto:uwe.nagel@uky.edu)). *Algorithms for strongly stable ideals*. Preliminary report.

Strongly stable ideals arise naturally in algebraic geometry, commutative algebra, and combinatorics. We present three algorithms for generating saturated strongly stable ideals: all such ideals with a given Hilbert polynomial, a particular ideal for each Hilbert function associated to a given Hilbert polynomial, and all such ideals with a given Hilbert function. The first algorithm is prompted by combinatorial approaches to studying the Hilbert scheme, and the second algorithm can be used to study strongly stable ideals having maximal total Betti numbers for a fixed Hilbert polynomial. We have implemented these algorithms in the computer algebra system *Macaulay2*. (Received September 09, 2011)