1086-11-1962 **Abhinav Kumar*** (`abhinav@math.mit.edu`), Department of Mathematics, Rm 2-169, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, and **Henry Cohn** (`cohn@microsoft.com`), Microsoft Research New England, One Memorial Drive, Cambridge, MA 02142. *Metacommutation of Hurwitz primes.*

Conway and Smith, in their book "On Quaternions and Octonions", studied factorization for integral (Hurwitz) quaternions, and introduced the metacommutation problem. Namely, if P and Q are prime Hurwitz integers of norms p and q (say) respectively, then $u = PQ$ also has a factorization of the form $u = Q'P'$, with Q' and P' of norms q and p respectively, unique up to unit-migration. They showed that factorization for the Hurwitz integers is unique up to the operations of unit-migration, metacommutation and recombination. The authors state that the problem of determining the metacommuting pair (Q', P') given (P, Q) does not seem to have been addressed in the literature. We study this question, and analyze some interesting properties of the metacommutation map. (Received September 24, 2012)