1145-57-901 **Mauricio Gutierrez** and **Zbigniew Nitecki*** (znitecki@tufts.edu). *Crossing Matrices for Braids.*

The crossing matrix of a braid on N strands is the $N \times N$ integer matrix with zero diagonal whose i, j entry is the algebraic number (positive minus negative) of crossings by strand i over strand j . When restricted to the subgroup of pure braids, this defines a homomorphism onto the additive subgroup of $N \times N$ symmetric integer matrices with zero diagonal–in fact, it represents the abelianization of this subgroup. As a function on the whole N-braid group, it is a derivation defined by the action of the symmetric group on square matrices. The set of all crossing matrices can be described using the natural decomposition of any braid as the product of a pure braid with a "permutation braid" in the sense of Thurston, but the subset of crossing matrices for positive braids is harder to describe. We formulate a finite algorithm which exhibits all positive braids with a given crossing matrix, if any exist, or declares that there are none. (Received September 17, 2018)