1086-03-1669 **Valentina Harizanov*** (harizanv@gwu.edu), Department of Mathematics, George Washington University, Washington, DC 20052. *Complexity of orders on algebraic structures.*

A magma $\mathcal{M} = (M, *)$ is an algebraic structure with a single binary operation. Although $*$ does not have to be associative, familiar examples of magmas include semigroups and groups. A linear order $<$ of the domain M, which is left-invariant with respect to the operation $*$ is a left order on $\mathcal{M}$. If $<$ is also right-invariant, then it is a bi-order on $\mathcal{M}$. Interesting examples of nonassociative magmas that are right-orderable come from knot theory and are called quandles. There is a natural topology on the set of all left orders on $\mathcal{M}$, as well as on the set of all bi-orders on $\mathcal{M}$. These spaces are compact for any orderable magma, while for some well-known groups, they are even homeomorphic to the Cantor set. Not all computable orderable groups have a computable order. Downey and Kurtz showed that there is such an abelian group. We further investigate degree theoretic complexity of orders on groups. We also investigate when the space of left orders or bi-orders on familiar computable groups is homeomorphic to the Cantor set, and how this topological property relates to the computability theoretic complexity of orders. (Received September 24, 2012)