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Akshay Gupte* (agupte@clemsun.edu), Clemson University, Clemson, SC 29634. *New families of approximations for the integer hull of a compact set.*

For a nonempty compact set $X \subset \mathbb{R}^n$, we are interested in its integer hull X_I , which is the convex hull of $X \cap \mathbb{Z}^n$. Compactness of X means that X_I is a polytope. We propose a novel scheme for generating inner and outer approximations of X_I through the use of total orders over \mathbb{Z}^n . Each approximation is a polytope corresponding to a finite subset of total orders. We prove convergence guarantees of our approximations to X_I under some structural assumptions on X . We also show that for some total orders, the best possible approximations can be as bad as n -approx in the general case. The outer approximations (relaxations) in our scheme suggest a new approach for generating strong valid inequalities to X_I . A key part of our constructs is the computation of minimal and maximal (under a total order) points in $X \cap \mathbb{Z}^n$. We present some complexity results in this regard. (Received September 25, 2018)