

1116-VA-2768      **Samuel Ivy\*** ([samuel.ivy@usma.edu](mailto:samuel.ivy@usma.edu)), United States Military Academy, West Point, NY 10996-.  
*Classifying the Fine Structures of Involutions Acting on Root Systems.*

Symmetric spaces, as the name suggests, offers the study of symmetries. It can be realized as spaces acted upon by a group of symmetries or motions (a Lie Group). This exposition focuses on the algebraic and combinatorial structures of symmetric spaces including the action of involutions on the underline root systems. The characterization of the orbits of parabolic subgroups acting on these symmetric spaces involves the action of both the symmetric space involution  $\theta$  on the maximal  $k$ -split tori and their root system and its opposite  $-\theta$ . While the action of  $\theta$  is often known, the action of  $-\theta$  is not well understood. This work focuses on building results and algorithms that enable one to derive the root system structure related to the action of  $-\theta$  from the root system structure related to  $\theta$ . This work involves algebraic group theory, combinatorics, and symbolic computation. (Received September 22, 2015)