1014-20-1023 **Christopoher E. Dometrius*** (dometrce@wfu.edu), Department of Mathematics, P.O. Box 7388, Wake Forest University, Winston-Salem, NC 27109, and **Aloysius Helminck** and **Ling Wu**. Bilinear Forms on $V = k^n$ and Involutions of $SL(n, k)$ and $SO(n, k, \beta)$.

Reductive symmetric spaces are defined as the homogeneous spaces G/H with G a reductive group and H the fixed point group of an involution. To classify these spaces one has to classify the involutions. We show first that there is a natural correspondence between outer involutions and non-degenerate symmetric or skew-symmetric bilinear forms. This enables one to classify isomorphism classes of these involutions using congruence properties of bilinear forms.
We use this to give a detailed characterization for the isomorphism classes of involutions of $SL(n, k)$ and classify them for a number of fields, including algebraically closed fields, real numbers, p-adic numbers, and finite fields. Next we give a characterization for the isomorphism classes of involutions of $SO(n, k, \beta)$ where β is any non-degenerate symmetric bilinear form. Finally, we classify the involutions of $SO(n, k, \beta)$ in the case of the standard bilinear form for the same fields listed above. (Received September 26, 2005)