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We consider the twisted conjugation action of the complex general linear group  $GL_n$  on the space of  $n \times n$  complex matrices given by  $g \cdot A = gAg^t$ . For a fixed unipotent element  $u \in GL_n$ , we describe the locus of matrices that are fixed by  $u$ ; the answer is in terms of its Jordan type.

When the action is restricted to non-degenerate symmetric or skew-symmetric matrices, it can be interpreted as a natural  $GL_n$ -action on certain symmetric spaces. We consider the extended action on the wonderful embedding of these symmetric spaces and describe the fixed locus of a regular unipotent element (i.e. having just a single Jordan block). In that case, we find that the fixed locus has a cell decomposition which we use to determine the Betti numbers of the fixed locus. (Received August 19, 2013)