On Jordan structure of nilpotent $so(N, C)$-matrices.

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Abstract. I consider the nilpotent case now, it is most interesting and compli-
cated case. A nilpotent matrix from the Lie algebra of orthogonal group can
be considered as a matrix of a nilpotent linear transformation of some auxil-
iary linear space. Any matrix has Jordan structure, that means that there is
a basis collected by cyclic vectors. This structure does not correlate with the
Euclidean structure, generally speaking.

I will demonstrate how to construct a basis from the cyclic vectors that
is in according with the Euclidean structure. It gives a splitting of the linear
space on the orthogonal sum of Euclidean subspaces with the Euclidean struc-
ture inherited from the ambient space. Each such subspace equipped with the
standard ("hyperbolic") basis collected from the cyclic vectors.

Each Jordan chain consisting of odd number of elements belongs to each
own subspace, and Jordan chains consisting of even number of elements come
in pairs. Each such pair forms a standard basis of the corresponding subspace.

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