1059-46-19 **Jan Lang*** (lang@math.ohio-state.edu), Department of Mathematics, OSU, 100 Math Tower, 231 West 18th Avenue, Columbus, OH 43210-1174. *The j-eigenfunctions and s-numbers.*

It is a truth universally acknowledged, that a compact linear map between Hilbert spaces has an excellent structure that can be described by projections on eigenmanifolds. However, until comparatively recently there were no similar results when the action takes place between Banach spaces. The focus of this communication is on these new developments.

Let X and Y be uniformly convex and uniformly smooth Banach spaces, and let $T : X \to Y$ be a compact linear map. Denote by J_X and J_Y normalized duality mappings on X and Y, respectively. We describe a geometric approach for obtaining a "new" class of eigenfunctions and eigenvalues for non-linear equations of the form

$$S^* J_Y S x = \lambda J_X x;$$

where S denotes the restriction of T to subspaces generated by James orthogonality. Our method, which seems to be more direct than the Lusternik-Schnirelmann method, is based use of James (otherwise called Birkhoff) orthogonality as a decomposition tool. Using the Hardy operator, for which we prove that "classical" eigenvalues, eigenvalues obtained by the L-S method and all "strict" s-numbers are same, we give numerical computations indicating that these new eigenfunctions lie outside the family of above classical eigenfunctions. (Received January 24, 2010)