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Lefschetz-type invariants and geometric equivariant KK-theory

We summarize recent work of the speaker and Ralf Meyer. This work aims to develop a theory of higher-dimensional Lefschetz fixed-point theory for geometric morphisms (or correspondences) from a space (a manifold) to itself. Classical fixed point theory studies the intersection of the diagonal X in $X \times X$ with an n-dimensional submanifold (say, the graph of a function from X to X). If these submanifolds are transverse, then the intersection is just a discrete set of points, *i.e.*, a zero-dimensional submanifold of X. More generally we can study the intersection of the diagonal with higher-dimensional submanifolds.

If a dimension $k > n$ submanifold W of $X \times X$ is transverse to the diagonal then it has a "fixed-point set" which is a $k - n$-dimensional (typically disconnected) submanifold of X; if W is oriented in K-theory then so is the fixed-submanifold, so it determines a K-homology class, its Lefschetz invariant. We will relate this Lefschetz invariant to a global invariant of the induced map on K-theory, and the (standard) ring structure on K-theory (which itself comes from the inclusion of the diagonal X in $X \times X$. We will work throughout in equivariant KK-theory, which gives noncommutative results.