Abstract Hodge decomposition and its applications

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(Joint work with J. Chuang)

We consider the abstract version of the Hodge decomposition (also known as a strong deformation retract data) on a chain complex. This is, roughly speaking, a decomposition of the complex into a direct sum of its homology and the contractible part. The most interesting case includes the existence of an inner product ('Poincare pairing') on the complex; the decomposition is supposed to be compatible with it in an appropriate way. We show that the choice of a Hodge decomposition on an algebra over a cyclic operad leads naturally to an explicit formula for the structure maps of a minimal model of this algebra. This is a generalization of the well-known result of Kadeishvili from the 1980's as well as more recent works of Merkulov, Kajiura and Lazaroiu.