

Chen's iterated integrals and loop spaces

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Abstract

Iterated integrals, as studied by K.-T. Chen, assign to a finite sequence of differential 1-forms a function on the space of paths. Evaluated on a path γ , these integrals become the coefficients of the *signature* of γ —a non-commutative formal power series that determines the path up to thin homotopy and time reparametrization.

Chen observed that this construction can be extended to differential forms of arbitrary degree, producing differential forms on path and loop spaces. This point of view turned out to be very useful in the study of the topology of loop spaces, and revealed many interesting connections to algebraic topology and representation theory, as well as to the study of higher dimensional analogues of the signature construction.

This survey talk follows some of these ideas from Chen's seminal work through contributions to algebraic topology by Adams, Gugenheim, and others.