

1107-93-167

Luis A Duffaut Espinosa*, lduffaut@gmu.edu. *Input-output operators with non-commutative iterated integrals.*

Fliess operators, also known as Chen-Fliess functional series expansions, have been established as descriptors of a broad class of nonlinear input-output maps. A tacit assumption in the standard theory of Fliess operators is that the input functions are mutually commutative. This assumption results in a great deal of simplification and hides certain underlying algebraic structures that are important in applications like control on Lie groups and quantum control. The objective here is to describe the role of non-commutative iterated integrals in the framework of input-output operators. In particular, the algebra of planar binary rooted trees is used to describe the algebra of non-commutative iterated integrals, and thus, a non-commutative version of the shuffle algebra is defined. Also, sufficient conditions for the convergence of the defining series are given. The theory is illustrated with a very simple bilinear system example. (Received January 12, 2015)