1100-93-331 **Matthias Kawski*** (kawski@asu.edu), School of Mathematical & Statistical Sciences, Arizona State University, Tempe, AZ 85287. *Hopf algebras and linear functionals in nonlinear control.* Preliminary report.

Agrachev's chronological calculus, a well-established powerful tool for the analysis on nonlinear control systems, considers controls and their associated flows as linear operators on the algebra of output functions. We demonstrate how the underlying combinatorial Hopf algebra structures provide insights into the geometry of nonlinear control systems and how they lead to more efficient algorithms, e.g., for path planning. The main focus is on translating combinatorial algebraic objects to dynamic and analytic objects, with special attention to the role of the observation algebra. (Received February 10, 2014)