

PLANAR ROOTED FORESTS AND PLANARLY BRANCHED ROUGH PATHS

KURUSCH EBRAHIMI-FARD

ABSTRACT. The shuffle Hopf algebra is based on Lie algebras without additional properties. Pre-Lie algebras and the Butcher–Connes–Kreimer Hopf algebra are providing algebraic descriptions of the geometry of Euclidean spaces. They form the foundation of Butcher’s B-series. Lie–Butcher theory combines Lie series with B-series. It is based on post-Lie algebras and a Hopf algebra on planar rooted forests, possibly decorated, introduced by Munthe-Kaas and Wright in the context of Runge–Kutta numerical methods on homogeneous spaces. Planarly branched rough paths are characters of this Hopf algebra subject to Hölder-type estimates. We will discuss how these are used in resolving singular differential equations on homogeneous spaces. Joint work with C. Curry, D. Manchon and H. Munthe-Kaas.

DEPARTMENT OF MATHEMATICAL SCIENCES, NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU), 7491 TRONDHEIM, NORWAY.