

Strange pre- and post-Lie structures on rooted trees

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We present a construction of pre-Lie on rooted trees whose edges and vertices are decorated, with a grafting product twisted by an action of a map acting on both edges and vertices. We show that this construction indeed gives a pre-Lie algebra if, and only if, a certain commutation relation is satisfied. Then, this pre-Lie algebra can be extended as a post-Lie algebra through a semi-direct product.

A particular example is used for normal forms in the study of stochastic PDEs. Here, the set of decorations of edges and vertices is \mathbb{N}^{d+1} and the acting map is the exponentiation of a simpler map.

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