

Gröbner-Shirshov Bases for Rota-Baxter Algebras and PBW Theorem for Dendriform Algebras

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We establish the Composition-Diamond lemma for associative nonunitary Rota-Baxter algebras with weight λ . As applications, we obtain a linear basis of a free commutative Rota-Baxter algebra without unity, show that every countably generated Rota-Baxter algebra with weight 0 can be embedded into a two-generated Rota-Baxter algebra. Moreover, by using this lemma, we prove that every dendriform algebra over a field of characteristic 0 can be embedded into its universal enveloping Rota-Baxter algebra of weight 0.