

SMOOTH MORPHISMS AND CAUCHY-KOVALEVSKAYA FOR BIALGEBRAS

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Abstract:

Let R be some commutative unital ring, H and K bialgebras over R , S a H -module algebra and T a K -module algebra. Inspired by the theory of D -modules we define a smooth morphism $(f, Df^*) : (H, S) \rightarrow (K, T)$ to be an algebra morphism $f : S \rightarrow T$ together with a functor Df^* making the following diagram commute on the nose for some choice of tensor functor $T \otimes_S -$:

$$\begin{array}{ccc}
 S \# H - \text{Mod} & \xrightarrow{Df^*} & T \# K - \text{Mod} \\
 \downarrow & & \downarrow \\
 S - \text{Mod} & \xrightarrow{T \otimes_S -} & T - \text{Mod}
 \end{array}$$

the vertical arrows being the forgetful functors.

In this talk we will show how this context and in particular the Cauchy-Kovalevskaya morphism of D -modules allows for a simultaneous generalization of Hopf Galois extensions and smooth maps in the C^∞ sense. We will also generalize some well known results to this context.