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New identities for differential-polynomial structures built from Jacobian determinants

The Nambu-determinant Poisson brackets on Rˆd are expressed by the formula

{f,g}*d (x) = \rho(x) \det(\partial(f,g,a_1,…a*{d-2}) / \partial(xˆ1,…,xˆd)),

where a_1,…,a_{d-2} are smooth functions and xˆ1,…,xˆd are global coordinates (e.g., Cartesian), so that \rho(x)\cdot\partial_{x} is the top-degree multivector.
For an example of Nambu–Poisson bracket in classical mechanics, consider the Euler top with {x,y}*3 = z and so on cyclically on Rˆ3.*
Independently, Nambu's binary bracket {-,-}_d with Jacobian determinant and d-2 Casimirs a_1,…,a{d-2} belong to the Nambu (1973) class of N-ary multi-linear antisymmetric polyderivational brackets {-,…,-}_d which satisfy natural N-ary generalizations of the Jacobi identity for Lie algebras.

In the study of Kontsevich's infinitsimal deformations of Poisson brackets by using 'good' cocycles from the graph complex, we detect case-by-case that these deformations preserve the Nambu class, and we observe new, highly nonlinear differential-polynomial identities for Jacobian determinants over affine manifolds. In this talk, several types of such identities will be presented.

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