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New Identities for Differential-polynomial Structures built from Jacobian Determinants

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The Nambu-determinant Poisson brackets on $\mathbb{R}^d$ are expressed by the formula

$\{f,g\}_d(\mathbf{x}) = \varrho(\mathbf{x}) \cdot \det\bigl(\partial(f,g,a_1,...a_{d-2})/\partial(x^1,...,x^d)\bigr)$,

where a_1, ..., a_{d-2} are smooth functions and x^1, ..., x^d are global coordinates (e.g., Cartesian), so that $\varrho(\mathbf{x}) \cdot \partial_{\mathrm{x}}$ 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 $\mathbb{R}^3$.
Independently, Nambu's binary bracket $\{-,-\}_d$ with Jacobian determinant and $d-2$ Casimirs $a_1,\ldots,a_{d-2}$ belong to the Nambu (1973) class of N-ary multi-linear antisymmetric polyderivational brackets $\{-,\ldots,-\}_d$ which satisfy natural N-ary generalizations of the Jacobi identity for Lie algebras.
In the study of Kontsevich's infinitesimal 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.
(Work in progress, joint with M.~Jagoe Brown, F.~Schipper, and R.~Buring; special thanks to the Habrok high-performance computing cluster.)

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