Some identities of Jacobi on Jacobians : old and new

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In his pioneering work, Jacobi discovered two remarkable identities related to the Jacobian. The first formula asserts that the Jacobian has a divergence structure. The second one, that some vector fields involving the cofactors of the Jacobian are divergence free.

We describe the origin, the extensions and the fundamental impact of these properties on various fields, including differential equations, analytical mechanics, topology, and functional analysis, from the times of Jacobi to our days.

This is a joint work with the late Haïm Brezis and Petru Mironescu.

References

H. Brezis, J. Mawhin and P. Mironescu, A brief history of the Jacobian, *Communic. in Contemporary Math.* 26 (2) (2024), Article Nr. 2330001, 20 p.