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Second-order integrable Lagrangians and WDVV equations

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We investigate the integrability of Euler-Lagrange equations associated with 2D second-order Lagrangians. By deriving integrability conditions for the Lagrangian density, examples of integrable Lagrangians expressible via elementary functions, Jacobi theta functions and dilogarithms are constructed. A link of second-order integrable Lagrangians to WDVV equations is established. Generalisations to 3D second-order integrable Lagrangians are also discussed.

Based on:

E.V. Ferapontov, M.V. Pavlov, Lingling Xue,

Second-order integrable Lagrangians and WDVV equations, Lett. Math. Phys. (2021); doi:10.1007/s11005-021-01403-3; arXiv:2007.03768.

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