

# On a unified formulation of completely integrable systems

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The purpose of this article is to show that a  $\mathcal{C}^1$  differential system on  $\mathbb{R}^n$  which admits a set of  $n-1$  independent  $\mathcal{C}^2$  conservation laws defined on an open subset  $\Omega \subseteq \mathbb{R}^n$ , is essentially  $\mathcal{C}^1$  equivalent on an open and dense subset of  $\Omega$ , with the linear differential system  $u'_1 = u_1, u'_2 = u_2, \dots, u'_n = u_n$ . The main results are illustrated in the case of two concrete dynamical systems, namely the three dimensional Lotka-Volterra system, and respectively the Euler equations from the free rigid body dynamics.

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