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Summary: Combining the Lie algebraic approach that is due to J. Wei and E. Norman [J. Math. Phys. 4, 575-581 (1963; Zbl 0133.34202)] and the ideas suggested by J. Drach [Compt. Rend. 168, 337-340 (1919; JFM 47.0412.01)], the author constructs several classes of systems of linear ordinary differential equations that are integrable by quadratures. Their integrability is ensured by integrability of the corresponding stationary cubic Schrödinger, KdV, and Harry-Dym equations. Next, he obtains a hierarchy of integrable reductions of the Dirac equation of an electron moving in the external field. Their integrability is shown to be in correspondence with the integrability of the stationary mKdV hierarchy.

MSC:
34A05 Explicit solutions, first integrals of ordinary differential equations
34A25 Analytical theory of ordinary differential equations: series, transformations, operational calculus, etc.
34L40 Particular ordinary differential operators (Dirac, one-dimensional Schrödinger, etc.)
34A45 Theoretical approximation of solutions to ordinary differential equations

Keywords:
stationary cubic Schrödinger, KdV, and Harry-Dym equations; Dirac equation; stationary mKdV hierarchy

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References:

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