Integrable systems in four independent variables: a systematic construction

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Abstract: We present a novel construction of integrable dispersionless partial differential systems in four independent variables possessing nonisospectral Lax pairs written in terms of contact vector fields.

The construction in question solves a long-standing problem of generalization to four dimensions of the class of three-dimensional integrable dispersionless systems admitting nonisospectral Lax pairs involving Hamiltonian vector fields.

We demonstrate that plenty of four-dimensional integrable systems can be constructed in a systematic fashion using our approach, and thus integrable partial differential systems in four independent variables are significantly less exceptional than it appeared before.