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Isospectral Hamiltonian flows in finite and infinite dimensions. II: Integration of flows. (English) Zbl 0717.58051

Commun. Math. Phys. 134, No. 3, 555-585 (1990).

In Part I of this paper [ibid. 117, No.3, 451-500 (1988; Zbl 0659.58022)], the authors showed how isospectral Hamiltonian flows in the space of rank r perturbations, $\mathcal{M}_A$, of an $n \times n$ matrix A can be derived from the Adler-Kostant-Symes theorem. These flows arise through the use of a moment map from $\mathcal{M}_A$ into the dual, $(gl(r)^+)^*$, of the positive part of the loop algebra $gl(r)$. Such systems were shown to be completely integrable under special assumptions on the spectrum of A and the resulting matrix polynomial L(λ)$\in (gl(r)^+)^*$.

The purpose of this part II is to provide a more unified, streamlined formulation which allows A and L(λ) to have more general spectra. Such a generalization is necessary to be able to treat important examples of integrable systems such as the coupled non-linear Schrödinger equation (CNLS). The authors illustrate their general constructions by explicitly solving CNLS as well as the Rosochatius equation.

Reviewer: W.J.Satzer jun

MSC:

37C10	Dynamics induced by flows and semiflows
37J35	Completely integrable finite-dimensional Hamiltonian systems, integration methods, integrability tests
37K10	Completely integrable infinite-dimensional Hamiltonian and Lagrangian systems, integration methods, integrability tests, integrable hierarchies (KdV, KP, Toda, etc.)
35Q55	NLS equations (nonlinear Schrödinger equations)

Cited in **2** Reviews
Cited in **36** Documents

Keywords:
isospectral flows; complete integrability; coupled non-linear Schrödinger equation

Full Text: DOI

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