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Unaffiliated
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To the Editor team of JMP,

I am pleased to submit my manuscript entitled “A Bell-Weierstrass Formalism for Rational Fredholm Equations and an Emergent Yang-Baxter Structure” for consideration for publication in JMP.

This paper introduces a new algebraic framework for solving Fredholm integral equations with rational kernels, a class of equations that appears frequently in mathematical physics, including in the Lieb–Liniger model and related integrable systems. The main contributions are:

A Bell–Weierstrass formalism that combines Weierstrass-type factorization with Bell-polynomial encoding of derivatives, allowing purely algebraic manipulation of kernel structures.

Derivation of formal transform recurrences that capture the Fredholm equation via integration-by-parts identities.

Demonstration of an emergent Temperley–Lieb R-matrix satisfying the Yang–Baxter equation, revealing a hidden integrable structure in the recurrence system.

A complete formal solution scheme applied to the previously unsolved Lieb–Love integral equation, with explicit reconstruction via moment expansion.

The work is entirely formal and algebraic, avoiding analytic assumptions, and bridges integral equations with algebraic integrability. The results are presented in a self-contained manner, with algorithmic steps and diagrammatic support where helpful.

I believe this paper aligns well with JMP’s focus on integrable systems, symmetry, and algebraic methods in mathematical physics. It offers both structural insight and a practical method for a class of equations of broad interest.

This manuscript has not been previously published and is not under consideration elsewhere. I have no conflicts of interest to disclose.

Thank you for your time and consideration. I look forward to your response.*

Sincerely,
Drew Remmenga