

Seiberg-Witten curves and double-elliptic integrable systems

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Integrable N -particle systems have an important property that associated Seiberg-Witten prepotentials satisfy WDVV equations. However, this does not apply to the most interesting class of elliptic and double-elliptic systems. Studying the commutativity conjecture for theta-functions on associated spectral curve families, we derive other non-linear equations for the perturbative Seiberg-Witten prepotential, which turn to have exactly the double-elliptic system as its generic solution. In contrast with WDVV, equations acquire non-perturbative corrections which are straightforwardly deducible from the commutativity conditions. We obtain such corrections in the first non-trivial case of $N = 3$ and describe the structure of non-perturbative solutions as expansions in powers of flat moduli with coefficients, which are modular forms of elliptic parameter.