The Interactions of Solitons in the Novikov-Veselov Equation

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Abstract

Using the reality condition of the solutions, one constructs the real Pfaffian N-solitons solutions of the Novikov-Veselov (NV) equation using the tau function and the Schur identity. By the minor-summation formula of the Pfaffian, we can study the interactions of solitons in the Novikov-Veselov equation from the Kadomtsev-Petviashvili (KP) equation’s point of view, that is, the totally non-negative Grassmannian. Especially, the Y-type resonance, O-type and the P-type interactions of X-shape are investigated; furthermore, the Mach-type soliton is studied to describe the resonance of incident wave and reflected wave. Also, the maximum amplitude of the intersection of these line solitons and the critical angle are calculated and one makes a comparison with the KP-II equation.