

Discrete Integrable Systems and Hodograph Transformations Arising from Motions of Discrete Plane Curves

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We consider integrable discretizations of some soliton equations associated with the motions of plane curves: the Wadati-Konno-Ichikawa elastic beam equation, the complex Dym equation, and the short pulse equation. They are related to the modified KdV or the sine-Gordon equations by the hodograph transformations. Based on the observation that the hodograph transformations are regarded as the Euler-Lagrange transformations of the curve motions, we construct the discrete analogues of the hodograph transformations, which yield integrable discretizations of those soliton equations.

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