Integrability of Models Arising from Motions of Plane Curves

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Four sets of nonlinear evolution equations which are viewed as generalizations of $K(n, m)$ ($n = m + 1, m + 2$) models, are introduced. It is shown that these equations, together with the $K(n, m)$ ($n = m + 1, m + 2$) models, arise naturally from motions of curves in several geometries, and they are Painlevé integrable.

Other gauge equivalent integrable equations are obtained by use of the equivalence between integrable equations for the curvature and graph of the curves. In particular, we obtain the generalized WKI equation and its one-loop soliton solutions.

Key words: Motion of Plane Curve, Integrable Equation; Loop-soliton; Painlevé Property; Gauge Transformation.