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Bi-Hamiltonian Structure of a Third-Order Nonlinear Evolution Equation on Plane Curve Motions

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Abstract: In the present paper, we identify the integrability of the third-order nonlinear evolution equation $u_t=(1/2)((u_{xx}+u)^{-2})_x$ in a Hamiltonian viewpoint. We prove that the recursion operator obtained by S.Yu. Sakovich is hereditary, and then deduce a bi-Hamiltonian structure of the equation by using some decomposition of the hereditary operator. A hierarchy associated to the equation is also shown.

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Key words: nonlinear evolution equation, bi-Hamiltonian structure, hereditary operator, integrability

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