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A Method for Obtaining Integrable Couplings

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Abstract: By making use of the vector product in R^3, a commuting operation is introduced so that R^3 becomes a Lie algebra. The resulting loop algebra \tilde R^3 is presented, from which the well-known AKNS hierarchy is produced. Again via applying the superposition of the commuting operations of the Lie algebra, a commuting operation in R^6 is constructed so that R^6 becomes a Lie algebra. Thanks to the corresponding loop algebra \tilde R^3 of the Lie algebra R^3, the integrable coupling of the AKNS system is obtained. The method presented in this paper is rather simple and can be used to work out integrable coupling systems of the other known integrable hierarchies of soliton equations.

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