

THE CALCULUS OF GENERATING FUNCTIONS AND THE FORMAL ENERGY FOR HAMILTONIAN ALGORITHMS

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摘要

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Abstract In [2--4], symplectic schemes of arbitrary order are constructed by generating functions. However the construction of generating functions is dependent on the chosen coordinates. One would like to know that under what circumstance the construction of generating functions will be independent of the coordinates. The generating functions are deeply associated with the conservation laws, so it is important to study their properties and computations. This paper will begin with the study of Darboux transformation, then in section 2, a normalization Darboux transformation will be defined naturally. Every symplectic scheme which is constructed from Darboux transformation and compatible with the Hamiltonian equation will satisfy this normalization condition. In section 3, we will study transformation properties of generator maps and generating functions. Section 4 will be devoted to the study of the relationship between the invariance of generating functions and the generator maps. In section 5, formal symplectic energy of symplectic schemes are presented.

Key words [enerating function](#) [calculus of generating functions](#) [Darboux transformation cotangent bundles](#) [Lagrangian submanifold](#) [invariance of generating function](#) [formal energy.](#)

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