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ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

ISSN: 0976-3376

Asian Journal of Science and Technology
Vol. 08, Issue, 07, pp.5069-5078, July, 2017

RESEARCH ARTICLE

ON THE CLIFFORD HAMILTON FORMULATION OF SYMPLECTIC MECHANICS USING FRAME AND CO-FRAME FIELDS

[1]Gebreel Mohammed Khur Baba Gebreel and [2]Mohammed Ali Bashir

[1]Department of Mathematics, Faculty of Education, West Kordufan University, Khartoum-Sudan
[2]Academy of Engineering Sciences Khartoum-Sudan

ARTICLE INFO

Article History:
Received 22nd April, 2017
Received in revised form
17th May, 2017
Accepted 04th June 2017
Published online 24th July, 2017

Key words:
Theorem, Frame fields, Clifford $K\ddot{a}hler$ Manifolds,
Hamilton Mechanics.

ABSTRACT

In this paper using the frame fields $i_X = X^{an+i}\frac{\partial}{\partial x_{an+i}}, a = 0,1,2,\dots,7$ instead of the Hamiltonian vector field in the Clifford Hamiltonian formulation we verified the generalized form of Hamilton equation which is in conformity with the results that have been obtained previously.

INTRODUCTION

Modern differential geometry explains explicitly the dynamics of Hamilton's. So, if Q is an $m-dimensional$ configuration manifold and $H:T^*Q \to R$ is a regular Hamilton function, then there is a unique vector field $X \text{ on } T^*Q$ such that dynamic equations are determined by

$$i_X\Phi = \mathrm{dH} \tag{1}$$

Where Φ indicates the symplectic form. The triple (T^*Q, Φ, X) is called Hamilton system on the cotangent bundle T^*Q. At last time, there are many studies and books about Hamilton mechanics, formalisms systems and equations such that real, complex, paracomplex and other analogues [1,2] and there in. Therefore it is possible to obtain different analogous in different spaces. It is known that quaternions were invented by Sir William Rowan Hamilton as an extension to the complex numbers. Hamilton's defining relation is most succinctly written as:

$$i^2 = j^2 = k^2 = ijk = -1 \tag{2}$$

If it is compared to the calculus of vectors, quaternions have slipped into the realm of obscurity. They do however still find use in the computation of rotations. A lot of physical laws in classical, relativistic, and quantum mechanics can be written pleasantly by means of quaternions. Some physicists hope they will find deeper understanding of the universe by restating basic principles in erms of quaternion algebra. It is well-known that quaternions are useful for representing rotations in both quantum and classical mechanics [3]. It is well known that Clifford manifold is a quaternion manifold. So, all properties defined on quaternion manifold of $dimension\ 8n$ also is valid for Clifford manifold. Hence, it may be constructed mechanical equations on Clifford $K\ddot{a}hler$ manifold.

****Corresponding author: Gebreel Mohammed Khur Baba Gebreel,***
Department of Mathematics, Faculty of Education, West Kordufan University, Khartoum-Sudan.

Preliminaries

In this paper, all mappings and manifolds are assumed to be smooth, i.e. infinitely differentiable and sum is taken over repeated indices. By $\mathcal{F}(M), \mathcal{X}(M)$ and $\Lambda^1(M)$ we understand the set of functions on M, the set of vector fields on M and set of $1-forms\ on\ M$, respectively.

Theorem

Let f be differentiable ϕ, ψ are 1-form,then [4]:

- $d(f\phi) = df\wedge\phi + fd\phi$
- $d(\phi\wedge\psi) = d\phi\wedge\psi - \phi\wedge d\psi$

Frame Fields [5]:

If U, x is a chart on a smooth $n-manifold$ then written $\mathrm{x} = (x^1, \dots, x^n)$ we have vector fields defined on U by

$$\frac{\partial}{\partial x^i} : p \to \frac{\partial}{\partial x^i}\Big|_p$$

Such that the together the $\frac{\partial}{\partial x^i}$ form a basis at each tangent space at point in U. We call the set of fields $\frac{\partial}{\partial x^1}, \dots, \frac{\partial}{\partial x^n}$ a holonomic frame field over U. If X is a vector field defined on some set including this local chart domain U then for some smooth functions X^i defined on U we have

$$X(p) = \sum X^i(p)\frac{\partial}{\partial x^i}\Big|_p$$

Or in other words

$$X|_U = \sum X^i \frac{\partial}{\partial x^i}$$

Notice also that $dx^i : p \to dx^i|_p$ defines a field of co-vectors such that $dx^1|_p, \dots dx^n|_p$ forms a basis of $T_p^*M\ for\ each\ p \in U$. The fields form what is called a holonomic co-frame over U. In fact, the functions X^i are given by $dx^i(X): p \to dx^i\big|_p(X_p)$.

Clifford $K\ddot{a}hler$ Manifolds

Here, we recall and extend the main concepts and structures given in [6,7,8]. Let M be a real smooth manifold of dimension m. Suppose that there is a $6-dimensional$ vector bundle $V\ consisting\ of\ F_i(i = 1,2, \dots, 6)$ tensors of $type(1,1)\ over\ M$. Such a local basis $\{F_1, F_2, \dots, F_6\}$ is named a canonical local basis of the bundle V in a neighborhood $U\ of\ M$. Then V is called an almost Clifford structure in M. The pair (M, V) is named an almost Clifford manifold with V. Thus, an almost Clifford manifold $M\ is\ of\ dimension\ m = 8n$. If there exists on (M, V) a global basis $\{F_1, F_2, \dots, F_6\}$, then (M, V) is called an almost Clifford manifold; the basis $\{F_1, F_2, \dots, F_6\}$ is said to be a global basis for V.

An almost Clifford connection on the almost Clifford manifold (M, V) is a linear connection $\nabla\ on\ M$ which preserves by parallel transport the vector bundle V. This means that if Φ is a cross-section (local-global) of the bundle V. Then $\nabla_X \Phi$ is also a cross-section (local-global, respectively) of V, X being an arbitrary vector field of M.

If for any canonical basis $\{J_i\}, i = \overline{1,6}\ of\ V$ in a coordinate neighborhood U, the identities

$$g(J_iX, J_iY) = g(X, Y)\,,\ \forall X, Y \in \chi(M), i = 1,2, \dots, 6 \qquad (3)$$

Hold, the triple (M, g, V) is called an almost Clifford Hermitian manifold or metric Clifford manifold denoting by V an almost Clifford structure V and by g a Riemannian metric and by (g, V) an almost Clifford metric structure.

Since each $J_i (i = 1,2,\ldots,6)$ is almost Hermitian structure with respect to g, setting

$$\Phi_i(X,Y) = g(J_i X,Y), \quad i = 1,2,\ldots,6 \tag{4}$$

For any vector fields $X \text{ and } Y$, we see that Φ_i are 6-local 2-forms.

If the Levi-Civita connection $\nabla = \nabla^g$ on (M,g,V) preserves the vector bundle V by parallel transport, then (M,g,V) is named a Clifford $K\ddot{a}hler$ manifold, and an almost Clifford structure Φ_i of M is said to be a Clifford $K\ddot{a}hler$ structure. Suppose that let

$$\{x_i, x_{i+n}, x_{i+2n}, x_{i+3n}, x_{i+4n}, x_{i+5n}, x_{i+6n}, x_{i+7n}\}, i = \overline{1,n}$$

be a real coordinate system on (M,V).

The frame field represents the natural bases over R of the tangent space $T(M)$ of M and can be written:

$$\left\{\frac{\partial}{\partial x_{an+i}}\right\}, \quad a = 0,1,2,3,\ldots 7 \tag{5}$$

The co-frame field represents the natural bases over R of the cotangent space $T^*(M)$ of M and can be written:

$$\{dx_{an+i}\}, \quad a = 0,1,2,3,\ldots,7 \tag{6}$$

By structure $\{J_1, J_2, J_3, J_4, J_5, J_6\}$ the following expressions are given

$$\begin{array}{lll}
J_1\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{n+i}} & J_2\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{2n+i}} & J_3\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{3n+i}} \\
J_1\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_i} & J_2\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_{4n+i}} & J_3\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_{5n+i}} \\
J_1\left(\frac{\partial}{\partial x_{2n+i}}\right) = \frac{\partial}{\partial x_{4n+i}} & J_2\left(\frac{\partial}{\partial x_{2n+i}}\right) = -\frac{\partial}{\partial x_i} & J_3\left(\frac{\partial}{\partial x_{2n+i}}\right) = -\frac{\partial}{\partial x_{6n+i}} \\
J_1\left(\frac{\partial}{\partial x_{i+3n}}\right) = \frac{\partial}{\partial x_{i+5n}} & J_2\left(\frac{\partial}{\partial x_{i+3n}}\right) = \frac{\partial}{\partial x_{i+6n}} & J_3\left(\frac{\partial}{\partial x_{i+3n}}\right) = -\frac{\partial}{\partial x_i} \\
J_1\left(\frac{\partial}{\partial x_{i+4n}}\right) = -\frac{\partial}{\partial x_{i+2n}} & J_2\left(\frac{\partial}{\partial x_{i+4n}}\right) = \frac{\partial}{\partial x_{i+n}} & J_3\left(\frac{\partial}{\partial x_{i+4n}}\right) = \frac{\partial}{\partial x_{i+7n}} \\
J_1\left(\frac{\partial}{\partial x_{i+5n}}\right) = -\frac{\partial}{\partial x_{i+3n}} & J_2\left(\frac{\partial}{\partial x_{i+5n}}\right) = -\frac{\partial}{\partial x_{i+7n}} & J_3\left(\frac{\partial}{\partial x_{i+5n}}\right) = \frac{\partial}{\partial x_{i+n}} \\
J_1\left(\frac{\partial}{\partial x_{6n+i}}\right) = \frac{\partial}{\partial x_{7n+i}} & J_2\left(\frac{\partial}{\partial x_{6n+i}}\right) = -\frac{\partial}{\partial x_{3n+i}} & J_3\left(\frac{\partial}{\partial x_{6n+i}}\right) = \frac{\partial}{\partial x_{2n+i}} \\
J_1\left(\frac{\partial}{\partial x_{7n+i}}\right) = -\frac{\partial}{\partial x_{6n+i}} & J_2\left(\frac{\partial}{\partial x_{7n+i}}\right) = \frac{\partial}{\partial x_{5n+i}} & J_3\left(\frac{\partial}{\partial x_{7n+i}}\right) = -\frac{\partial}{\partial x_{4n+i}} \\
J_4\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{4n+i}} & J_5\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{5n+i}} & J_6\left(\frac{\partial}{\partial x_i}\right) = \frac{\partial}{\partial x_{6n+i}} \\
J_4\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_{2n+i}} & J_5\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_{3n+i}} & J_6\left(\frac{\partial}{\partial x_{n+i}}\right) = -\frac{\partial}{\partial x_{7n+i}} \\
J_4\left(\frac{\partial}{\partial x_{2n+i}}\right) = \frac{\partial}{\partial x_{n+i}} & J_5\left(\frac{\partial}{\partial x_{2n+i}}\right) = -\frac{\partial}{\partial x_{7n+i}} & J_6\left(\frac{\partial}{\partial x_{2n+i}}\right) = -\frac{\partial}{\partial x_{3n+i}} \\
J_4\left(\frac{\partial}{\partial x_{3n+i}}\right) = -\frac{\partial}{\partial x_{7n+i}} & J_5\left(\frac{\partial}{\partial x_{3n+i}}\right) = \frac{\partial}{\partial x_{n+i}} & J_6\left(\frac{\partial}{\partial x_{3n+i}}\right) = \frac{\partial}{\partial x_{2n+i}} \\
J_4\left(\frac{\partial}{\partial x_{4n+i}}\right) = -\frac{\partial}{\partial x_i} & J_5\left(\frac{\partial}{\partial x_{4n+i}}\right) = \frac{\partial}{\partial x_{6n+i}} & J_6\left(\frac{\partial}{\partial x_{4n+i}}\right) = \frac{\partial}{\partial x_{5n+i}} \\
J_4\left(\frac{\partial}{\partial x_{5n+i}}\right) = \frac{\partial}{\partial x_{6n+i}} & J_5\left(\frac{\partial}{\partial x_{5n+i}}\right) = -\frac{\partial}{\partial x_i} & J_6\left(\frac{\partial}{\partial x_{5n+i}}\right) = -\frac{\partial}{\partial x_{4n+i}} \\
J_4\left(\frac{\partial}{\partial x_{6n+i}}\right) = -\frac{\partial}{\partial x_{5n+i}} & J_5\left(\frac{\partial}{\partial x_{6n+i}}\right) = -\frac{\partial}{\partial x_{4n+i}} & J_6\left(\frac{\partial}{\partial x_{6n+i}}\right) = -\frac{\partial}{\partial x_i} \\
J_4\left(\frac{\partial}{\partial x_{7n+i}}\right) = \frac{\partial}{\partial x_{3n+i}} & J_5\left(\frac{\partial}{\partial x_{7n+i}}\right) = \frac{\partial}{\partial x_{2n+i}} & J_6\left(\frac{\partial}{\partial x_{7n+i}}\right) = \frac{\partial}{\partial x_{n+i}}
\end{array} \tag{7}$$

A canonical local basis $\{J_1^*, J_2^*, J_3^*, J_4^*, J_5^*, J_6^*\}$ of V^* of the cotangent space $T^*(M)$ of manifold M satisfies the following condition:

$$J_1^{*2} = J_2^{*2} = J_3^{*2} = J_4^{*2} = J_5^{*2} = J_6^{*2} = -I, \tag{8}$$

Being

$$
\begin{array}{lll}
J_1^*(dx_i) = dx_{n+i} & J_2^*(dx_i) = dx_{2n+i} & J_3^*(dx_i) = dx_{3n+i} \\
J_1^*(dx_{n+i}) = -dx_i & J_2^*(dx_{n+i}) = -dx_{4n+i} & J_3^*(dx_{n+i}) = -dx_{5n+i} \\
J_1^*(dx_{2n+i}) = dx_{4n+i} & J_2^*(dx_{2n+i}) = -dx_i & J_3^*(dx_{2n+i}) = -dx_{6n+i} \\
J_1^*(dx_{3n+i}) = dx_{5n+i} & J_2^*(dx_{3n+i}) = dx_{6n+i} & J_3^*(dx_{3n+i}) = -dx_i \\
J_1^*(dx_{4n+i}) = -dx_{2n+i} & J_2^*(dx_{4n+i}) = dx_{n+i} & J_3^*(dx_{4n+i}) = dx_{7n+i} \\
J_1^*(dx_{5n+i}) = -dx_{3n+i} & J_2^*(dx_{5n+i}) = -dx_{7n+i} & J_3^*(dx_{5n+i}) = dx_{n+i} \\
J_1^*(dx_{6n+i}) = dx_{7n+i} & J_2^*(dx_{6n+i}) = -dx_{3n+i} & J_3^*(dx_{6n+i}) = dx_{2n+i} \\
J_1^*(dx_{7n+i}) = -dx_{6n+i} & J_2^*(dx_{7n+i}) = dx_{5n+i} & J_3^*(dx_{7n+i}) = -dx_{4n+i} \\
J_4^*(dx_i) = dx_{4n+i} & J_5^*(dx_i) = dx_{5n+i} & J_6^*(dx_i) = dx_{6n+i} \\
J_4^*(dx_{n+i}) = -dx_{2n+i} & J_5^*(dx_{n+i}) = -dx_{3n+i} & J_6^*(dx_{n+i}) = -dx_{7n+i} \\
J_4^*(dx_{2n+i}) = dx_{n+i} & J_5^*(dx_{2n+i}) = -dx_{7n+i} & J_6^*(dx_{2n+i}) = -dx_{3n+i} \\
J_4^*(dx_{3n+i}) = -dx_{7n+i} & J_5^*(dx_{3n+i}) = dx_{n+i} & J_6^*(dx_{3n+i}) = dx_{2n+i} \\
J_4^*(dx_{4n+i}) = -dx_i & J_5^*(dx_{4n+i}) = dx_{6n+i} & J_6^*(dx_{4n+i}) = dx_{5n+i} \\
J_4^*(dx_{5n+i}) = dx_{6n+i} & J_5^*(dx_{5n+i}) = -dx_i & J_6^*(dx_{5n+i}) = -dx_{4n+i} \\
J_4^*(dx_{6n+i}) = -dx_{5n+i} & J_5^*(dx_{6n+i}) = -dx_{4n+i} & J_6^*(dx_{6n+i}) = -dx_i \\
J_4^*(dx_{7n+i}) = dx_{3n+i} & J_5^*(dx_{7n+i}) = dx_{2n+i} & J_6^*(dx_{7n+i}) = dx_{n+i}
\end{array} \quad (9)
$$

Hamilton Mechanics

In this section, we obtain Hamilton equations and Hamilton mechanical system for quantum and classical mechanics by means of a canonical local basis $\{J_1^*, J_2^*, J_3^*, J_4^*, J_5^*, J_6^*\}$ *of* V on Clifford $Kähler\ manifold\ (M,V)$. We saw that the Hamilton equations using basis $\{J_1^*, J_2^*, J_3^*\}$ of V *on* (R^{8n}, V) are introduced in [9]. In this study, it is seen that they are the same as the equations obtained by operators J_1^*, J_2^*, J_3^* on Clifford $Kähler\ manifold\ (M,V)$. If we redetermine them, they are respectively:

First:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_i}, \frac{dx_{2n+i}}{dt} = -\frac{\partial H}{\partial x_{4n+i}}, \frac{dx_{3n+i}}{dt} = -\frac{\partial H}{\partial x_{5n+i}},$$
$$\frac{dx_{4n+i}}{dt} = \frac{\partial H}{\partial x_{2n+i}}, \frac{dx_{5n+i}}{dt} = \frac{\partial H}{\partial x_{3n+i}}, \frac{dx_{6n+i}}{dt} = -\frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{7n+i}}{dt} = \frac{\partial H}{\partial x_{6n+i}}$$

Second:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{2n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_{4n+i}}, \frac{dx_{2n+i}}{dt} = \frac{\partial H}{\partial x_i}, \frac{dx_{3n+i}}{dt} = -\frac{\partial H}{\partial x_{6n+i}},$$
$$\frac{dx_{4n+i}}{dt} = -\frac{\partial H}{\partial x_{n+i}}, \frac{dx_{5n+i}}{dt} = \frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{6n+i}}{dt} = \frac{\partial H}{\partial x_{3n+i}}, \frac{dx_{7n+i}}{dt} = -\frac{\partial H}{\partial x_{5n+i}}$$

Third:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{3n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_{5n+i}}, \frac{dx_{2n+i}}{dt} = \frac{\partial H}{\partial x_{6n+i}}, \frac{dx_{3n+i}}{dt} = -\frac{\partial H}{\partial x_i},$$
$$\frac{dx_{4n+i}}{dt} = -\frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{5n+i}}{dt} = -\frac{\partial H}{\partial x_{n+i}}, \frac{dx_{6n+i}}{dt} = -\frac{\partial H}{\partial x_{2n+i}}, \frac{dx_{7n+i}}{dt} = \frac{\partial H}{\partial x_{4n+i}}$$

Fourth, let (M,V) be a Clifford $Kähler$ manifold. Suppose that a component of almost Clifford structure V^*, a Liouville form and a 1-form on Clifford $Kähler$ manifold (M,V) are given by $J_4^*, \lambda_{J_4^*}$ *and* $\omega_{J_4^*}$, respectively. Putting

$$\omega_{J_4^*} = \frac{1}{2}(x_i dx_i + x_{n+i}dx_{n+i} + x_{2n+i}dx_{2n+i} + x_{3n+i}dx_{3n+i} + x_{4n+i}dx_{4n+i} +$$
$$x_{5n+i}dx_{5n+i} + x_{6n+i}dx_{6n+i} + x_{7n+i}dx_{7n+i}) \quad (10)$$

In this equation can be concise manner

$$\omega_{J_4^*} = \frac{1}{2}\sum_{a=0}^{7} x_{an+i}\, dx_{an+i} \quad (11)$$

We have

$$\lambda_{J_4^*} = J_4^*(\omega_{J_4^*}) = \frac{1}{2}(x_i dx_{4n+i} - x_{n+i}dx_{2n+i} + x_{2n+i}dx_{n+i} - x_{3n+i}dx_{7n+i}$$

$-x_{4n+i}dx_i + x_{5n+i}dx_{6n+i} - x_{6n+i}dx_{5n+i} + x_{7n+i}dx_{3n+i})$

It is know that $\Phi_{J_4^*}$ is closed $K\ddot{a}hler$ form on Clifford $K\ddot{a}hler$ manifold (M,V), then $\Phi_{J_4^*}$ is also a symplectic structure on Clifford $K\ddot{a}hler$ manifold (M,V).

Can be written Hamilton vector field X associated with Hamilton energy H by using frame fields formula:

$$X = \sum_{a=0}^{7} X^{an+i}\frac{\partial}{\partial x_{an+i}} \tag{12}$$

Then

$$\Phi_{J_4^*} = -d\lambda_{J_4^*} = dx_{n+i}\wedge dx_{2n+i} + dx_{3n+i}\wedge dx_{7n+i} + dx_{4n+i}\wedge dx_i + dx_{6n+i}\wedge dx_{5n+i} \tag{13}$$

Can be written i_X by using frame fields

$$i_X = X^{an+i}\frac{\partial}{\partial x_{an+i}} \quad a = 0,1,2,\dots,7 \tag{14}$$

If: $a = 0 \quad \Rightarrow \quad i_X = X^i\frac{\partial}{\partial x_i}$

$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^i\frac{\partial}{\partial x_i}dx_{n+i}.dx_{2n+i} - X^i\frac{\partial}{\partial x_i}dx_{2n+i}.dx_{n+i} + X^i\frac{\partial}{\partial x_i}dx_{3n+i}.dx_{7n+i}$$
$$-X^i\frac{\partial}{\partial x_i}dx_{7n+i}.dx_{3n+i} + X^i\frac{\partial}{\partial x_i}dx_{4n+i}.dx_i - X^i\frac{\partial}{\partial x_i}dx_i.dx_{4n+i} +$$
$$X^i\frac{\partial}{\partial x_i}dx_{6n+i}.dx_{5n+i} - X^i\frac{\partial}{\partial x_i}dx_{5n+i}.dx_{6n+i} \quad \Rightarrow$$
$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{n+i}dx_{2n+i} - X^{2n+i}dx_{n+i} + X^{3n+i}dx_{7n+i} - X^{7n+i}dx_{3n+i}$$
$$+X^{4n+i}dx_i - X^i dx_{4n+i} + X^{6n+i}dx_{5n+i} - X^{5n+i}dx_{6n+i}$$

If: $a = 1 \quad \Rightarrow \quad i_X = X^{n+i}\frac{\partial}{\partial x_{n+i}}$

$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{n+i}.dx_{2n+i} - X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{2n+i}.dx_{n+i} +$$
$$X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{3n+i}.dx_{7n+i} - X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{7n+i}.dx_{3n+i} + X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{4n+i}.dx_i -$$
$$X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_i.dx_{4n+i} + X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{6n+i}.dx_{5n+i} - X^{n+i}\frac{\partial}{\partial x_{n+i}}dx_{5n+i}.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{n+i}dx_{2n+i} - X^{2n+i}dx_{n+i} + X^{3n+i}dx_{7n+i} - X^{7n+i}dx_{3n+i}$$
$$+X^{4n+i}dx_i - X^i dx_{4n+i} + X^{6n+i}dx_{5n+i} - X^{5n+i}dx_{6n+i}$$

If: $a = 2 \quad \Rightarrow \quad i_X = X^{2n+i}\frac{\partial}{\partial x_{2n+i}}$

$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{n+i}.dx_{2n+i} - X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{2n+i}.dx_{n+i} +$$
$$X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{3n+i}.dx_{7n+i} - X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{7n+i}.dx_{3n+i} + X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{4n+i}.dx_i -$$
$$X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_i.dx_{4n+i} + X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{6n+i}.dx_{5n+i} - X^{2n+i}\frac{\partial}{\partial x_{2n+i}}dx_{5n+i}.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{n+i}dx_{2n+i} - X^{2n+i}dx_{n+i} + X^{3n+i}dx_{7n+i} - X^{7n+i}dx_{3n+i}$$
$$+X^{4n+i}dx_i - X^i dx_{4n+i} + X^{6n+i}dx_{5n+i} - X^{5n+i}dx_{6n+i}$$

⋮

If: $a = 7 \quad \Rightarrow \quad i_X = X^{7n+i}\frac{\partial}{\partial x_{7n+i}}$

$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{n+i}.dx_{2n+i} - X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{2n+i}.dx_{n+i} +$$
$$X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{3n+i}.dx_{7n+i} - X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{7n+i}.dx_{3n+i} + X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{4n+i}.dx_i -$$
$$X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_i.dx_{4n+i} + X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{6n+i}.dx_{5n+i} - X^{7n+i}\frac{\partial}{\partial x_{7n+i}}dx_{5n+i}.dx_{6n+i} \Rightarrow$$

$$i_X\Phi_{J_4^*} = \Phi_{J_4^*}(X) = X^{n+i}dx_{2n+i} - X^{2n+i}dx_{n+i} + X^{3n+i}dx_{7n+i} - X^{7n+i}dx_{3n+i} + X^{4n+i}dx_i - X^i dx_{4n+i} + X^{6n+i}dx_{5n+i} - X^{5n+i}dx_{6n+i} \quad (15)$$

For all $a = 0,1,2,3,\ldots,7$ we obtain equation (15).

Furthermore, the differential of Hamilton energy is obtained as follows:

$$dH = \frac{\partial H}{\partial x_i}dx_i + \frac{\partial H}{\partial x_{n+i}}dx_{n+i} + \frac{\partial H}{\partial x_{2n+i}}dx_{2n+i} + \frac{\partial H}{\partial x_{3n+i}}dx_{3n+i} + \frac{\partial H}{\partial x_{4n+i}}dx_{4n+i} + \frac{\partial H}{\partial x_{5n+i}}dx_{5n+i} + \frac{\partial H}{\partial x_{6n+i}}dx_{6n+i} + \frac{\partial H}{\partial x_{7n+i}}dx_{7n+i} \quad (16)$$

According to Eq(1) if equaled Eq(15) and Eq(16), the Hamilton vector field is calculated as follows:

$$X = -\frac{\partial H}{\partial x_{4n+i}}\frac{\partial}{\partial x_i} + \frac{\partial H}{\partial x_{2n+i}}\frac{\partial}{\partial x_{n+i}} - \frac{\partial H}{\partial x_{n+i}}\frac{\partial}{\partial x_{2n+i}} + \frac{\partial H}{\partial x_{7n+i}}\frac{\partial}{\partial x_{3n+i}} + \frac{\partial H}{\partial x_i}\frac{\partial}{\partial x_{4n+i}} - \frac{\partial H}{\partial x_{6n+i}}\frac{\partial}{\partial x_{5n+i}} + \frac{\partial H}{\partial x_{5n+i}}\frac{\partial}{\partial x_{6n+i}} - \frac{\partial H}{\partial x_{3n+i}}\frac{\partial}{\partial x_{7n+i}} \quad (17)$$

Assume that a curve

$$\alpha : R \rightarrow M \quad (18)$$

Be an integral curve of the Hamilton vector field X, i.e. ,

$$X(\alpha(t)) = \dot{\alpha} \ , \ t \in R \quad (19)$$

In the local coordinates, it is found that

$$\alpha(t) = (x_i, x_{n+i}, x_{2n+i}, x_{3n+i}, x_{4n+i}, x_{5n+i}, x_{6n+i}, x_{7n+i}) \quad (20)$$

And

$$\dot{\alpha}(t) = \frac{dx_i}{dt}\frac{\partial}{\partial x_i} + \frac{dx_{n+i}}{dt}\frac{\partial}{\partial x_{n+i}} + \frac{dx_{2n+i}}{dt}\frac{\partial}{\partial x_{2n+i}} + \frac{dx_{3n+i}}{dt}\frac{\partial}{\partial x_{3n+i}} + \frac{dx_{4n+i}}{dt}\frac{\partial}{\partial x_{4n+i}} + \frac{dx_{5n+i}}{dt}\frac{\partial}{\partial x_{5n+i}} + \frac{dx_{6n+i}}{dt}\frac{\partial}{\partial x_{6n+i}} + \frac{dx_{7n+i}}{dt}\frac{\partial}{\partial x_{7n+i}} \quad (21)$$

Thinking out Eq(19) if equaled Eq(17) and Eq(21), it follows:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{4n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_{2n+i}}, \frac{dx_{2n+i}}{dt} = -\frac{\partial H}{\partial x_{n+i}}, \frac{dx_{3n+i}}{dt} = \frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{4n+i}}{dt} = \frac{\partial H}{\partial x_i}, \frac{dx_{5n+i}}{dt} = -\frac{\partial H}{\partial x_{6n+i}}, \frac{dx_{6n+i}}{dt} = \frac{\partial H}{\partial x_{5n+i}}, \frac{dx_{7n+i}}{dt} = -\frac{\partial H}{\partial x_{3n+i}} \quad (22)$$

Hence, the equations obtained in Eq(22) are shown to be Hamilton equations with respect to component J_4^* of almost Clifford structure V^* on Clifford $K\ddot{a}hler$ manifold (M,V), and then the triple $(M, \Phi_{J_4^*}, X)$ is said to be a Hamilton mechanical system on Clifford $K\ddot{a}hler$ manifold (M,V). Fifth, let (M,V) be a Clifford $K\ddot{a}hler$ manifold. Assume that an element of almost Clifford structure V^*, a Liouville form and a 1-form on Clifford $K\ddot{a}hler$ manifold (M,V) are determined by $J_5^*, \lambda_{J_5^*}$ $and\ \omega J_5^*$, respectively.

Setting

$$\omega J_5^* = \frac{1}{2}(x_i dx_i + x_{n+i}dx_{n+i} + x_{2n+i}dx_{2n+i} + x_{3n+i}dx_{3n+i} + x_{4n+i}dx_{4n+i} + x_{5n+i}dx_{5n+i} + x_{6n+i}dx_{6n+i} + x_{7n+i}dx_{7n+i})$$

In this equation can be concise manner

$$\omega_{J_5^*} = \frac{1}{2}\sum_{a=0}^{7} x_{an+i}\, dx_{an+i}$$

We have

$$\lambda_{J_5^*} = J_5^*(\omega J_5^*) = \frac{1}{2}(x_i dx_{5n+i} - x_{n+i}dx_{3n+i} - x_{2n+i}dx_{7n+i} + x_{3n+i}dx_{n+i} + x_{4n+i}dx_{6n+i} - x_{5n+i}dx_i - x_{6n+i}dx_{4n+i} + x_{7n+i}dx_{2n+i}).$$

Assume that X is a Hamilton vector field related to Hamilton energy H and given by Eq(12).
Take into consideration

$$\Phi_{J_5^*} = -d\lambda_{J_5^*} = dx_{n+i}\wedge dx_{3n+i} + dx_{2n+i}\wedge dx_{7n+i} + dx_{5n+i}\wedge dx_i + dx_{6n+i}\wedge dx_{4n+i} \rightarrow (23)$$

Then from Eq (14) we obtained

If: $a = 0 \Rightarrow i_X = X^i \frac{\partial}{\partial x_i}$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^i \frac{\partial}{\partial x_i} dx_{n+i}.dx_{3n+i} - X^i \frac{\partial}{\partial x_i} dx_{3n+i}.dx_{n+i} + X^i \frac{\partial}{\partial x_i} dx_{2n+i}.dx_{7n+i} - X^i \frac{\partial}{\partial x_i} dx_{7n+i}.dx_{2n+i} + X^i \frac{\partial}{\partial x_i} dx_{5n+i}.dx_i - X^i \frac{\partial}{\partial x_i} dx_i.dx_{5n+i} + X^i \frac{\partial}{\partial x_i} dx_{6n+i}.dx_{4n+i} - X^i \frac{\partial}{\partial x_i} dx_{4n+i}.dx_{6n+i} \Rightarrow$$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{n+i}dx_{3n+i} - X^{3n+i}dx_{n+i} + X^{2n+i}dx_{7n+i} - X^{7n+i}dx_{2n+i} + X^{5n+i}dx_i - X^i dx_{5n+i} + X^{6n+i}dx_{4n+i} - X^{4n+i}dx_{6n+i}$$

If: $a = 1 \Rightarrow i_X = X^{n+i} \frac{\partial}{\partial x_{n+i}}$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{n+i}.dx_{3n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{3n+i}.dx_{n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{2n+i}.dx_{7n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{7n+i}.dx_{2n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{5n+i}.dx_i - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_i.dx_{5n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{6n+i}.dx_{4n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{4n+i}.dx_{6n+i} \Rightarrow$$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{n+i}dx_{3n+i} - X^{3n+i}dx_{n+i} + X^{2n+i}dx_{7n+i} - X^{7n+i}dx_{2n+i} + X^{5n+i}dx_i - X^i dx_{5n+i} + X^{6n+i}dx_{4n+i} - X^{4n+i}dx_{6n+i}$$

If: $a = 2 \Rightarrow i_X = X^{2n+i} \frac{\partial}{\partial x_{2n+i}}$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{n+i}.dx_{3n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{3n+i}.dx_{n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{2n+i}.dx_{7n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{7n+i}.dx_{2n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{5n+i}.dx_i - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_i.dx_{5n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{6n+i}.dx_{4n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{4n+i}.dx_{6n+i} \Rightarrow$$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{n+i}dx_{3n+i} - X^{3n+i}dx_{n+i} + X^{2n+i}dx_{7n+i} - X^{7n+i}dx_{2n+i} + X^{5n+i}dx_i - X^i dx_{5n+i} + X^{6n+i}dx_{4n+i} - X^{4n+i}dx_{6n+i}$$

⋮

If: $a = 7 \Rightarrow i_X = X^{7n+i} \frac{\partial}{\partial x_{7n+i}}$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{n+i}.dx_{3n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{3n+i}.dx_{n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{2n+i}.dx_{7n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{7n+i}.dx_{2n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{5n+i}.dx_i - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_i.dx_{5n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{6n+i}.dx_{4n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{4n+i}.dx_{6n+i} \Rightarrow$$

$$i_X\Phi_{J_5^*} = \Phi_{J_5^*}(X) = X^{n+i}dx_{3n+i} - X^{3n+i}dx_{n+i} + X^{2n+i}dx_{7n+i} - X^{7n+i}dx_{2n+i} + X^{5n+i}dx_i - X^i dx_{5n+i} + X^{6n+i}dx_{4n+i} - X^{4n+i}dx_{6n+i} \quad (24)$$

For all $a = 0,1,2,3,\dots,7$ we obtain equation (24).

Furthermore, the differential of Hamilton energy is obtained as follows:

$$dH = \frac{\partial H}{\partial x_i}dx_i + \frac{\partial H}{\partial x_{n+i}}dx_{n+i} + \frac{\partial H}{\partial x_{2n+i}}dx_{2n+i} + \frac{\partial H}{\partial x_{3n+i}}dx_{3n+i} + \frac{\partial H}{\partial x_{4n+i}}dx_{4n+i} + \frac{\partial H}{\partial x_{5n+i}}dx_{5n+i} + \frac{\partial H}{\partial x_{6n+i}}dx_{6n+i} + \frac{\partial H}{\partial x_{7n+i}}dx_{7n+i} \quad (25)$$

According to Eq(1) if equaled Eq(24) and Eq(25), the Hamilton vector field is calculated as follows:

$$X = -\frac{\partial H}{\partial x_{5n+i}}\frac{\partial}{\partial x_i} + \frac{\partial H}{\partial x_{3n+i}}\frac{\partial}{\partial x_{n+i}} + \frac{\partial H}{\partial x_{7n+i}}\frac{\partial}{\partial x_{2n+i}} - \frac{\partial H}{\partial x_{n+i}}\frac{\partial}{\partial x_{3n+i}} - \frac{\partial H}{\partial x_{6n+i}}\frac{\partial}{\partial x_{4n+i}} + \frac{\partial H}{\partial x_i}\frac{\partial}{\partial x_{5n+i}} + \frac{\partial H}{\partial x_{4n+i}}\frac{\partial}{\partial x_{6n+i}} - \frac{\partial H}{\partial x_{2n+i}}\frac{\partial}{\partial x_{7n+i}} \quad (26)$$

Assume that a curve

$$\alpha : R \rightarrow M \quad (27)$$

Be an integral curve of the Hamilton vector field X, i.e. ,

$$X(\alpha(t)) = \dot{\alpha} \ , \ t \in R \quad (28)$$

In the local coordinates, it is found that

$$\alpha(t) = (x_i, x_{n+i}, x_{2n+i}, x_{3n+i}, x_{4n+i}, x_{5n+i}, x_{6n+i}, x_{7n+i}) \rightarrow \quad (29)$$

And

$$\dot{\alpha}(t) = \frac{dx_i}{dt}\frac{\partial}{\partial x_i} + \frac{dx_{n+i}}{dt}\frac{\partial}{\partial x_{n+i}} + \frac{dx_{2n+i}}{dt}\frac{\partial}{\partial x_{2n+i}} + \frac{dx_{3n+i}}{dt}\frac{\partial}{\partial x_{3n+i}} + \frac{dx_{4n+i}}{dt}\frac{\partial}{\partial x_{4n+i}} + \frac{dx_{5n+i}}{dt}\frac{\partial}{\partial x_{5n+i}} + \frac{dx_{6n+i}}{dt}\frac{\partial}{\partial x_{6n+i}} + \frac{dx_{7n+i}}{dt}\frac{\partial}{\partial x_{7n+i}} \quad (30)$$

Thinking out Eq(28) if equaled Eq(26) and Eq(30), it follows:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{5n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_{3n+i}}, \frac{dx_{2n+i}}{dt} = \frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{3n+i}}{dt} = -\frac{\partial H}{\partial x_{n+i}}, \frac{dx_{4n+i}}{dt} = -\frac{\partial H}{\partial x_{6n+i}}, \frac{dx_{5n+i}}{dt} = \frac{\partial H}{\partial x_i}, \frac{dx_{6n+i}}{dt} = \frac{\partial H}{\partial x_{4n+i}}, \frac{dx_{7n+i}}{dt} = -\frac{\partial H}{\partial x_{2n+i}}. \quad (31)$$

Hence, the equations obtained in Eq(31) are shown to be Hamilton equations with respect to component J_5^* of almost Clifford structure V^* on Clifford $K\ddot{a}hler$ manifold (M,V), and then the triple $(M, \Phi_{J_5^*}, X)$ is said to be a Hamilton mechanical system on Clifford $K\ddot{a}hler$ manifold (M,V). Sixth, let (M,V) be Clifford $K\ddot{a}hler$ manifold. By $J_6^*, \lambda_{J_6^*}$ and ωJ_6^*, we denote a component of almost Clifford structure V^*, a Liouville form and a 1-form on Clifford $K\ddot{a}hler$ manifold (M,V), respectively.

Let ωJ_6^* be determined by

$$\omega J_6^* = \frac{1}{2}(x_i dx_i + x_{n+i}dx_{n+i} + x_{2n+i}dx_{2n+i} + x_{3n+i}dx_{3n+i} + x_{4n+i}dx_{4n+i} + x_{5n+i}dx_{5n+i} + x_{6n+i}dx_{6n+i} + x_{7n+i}dx_{7n+i})$$

In this equation can be concise manner

$$\omega_{J_6^*} = \frac{1}{2}\sum_{a=0}^{7} x_{an+i}\, dx_{an+i}$$

Then it yields

$$\lambda_{J_6^*} = J_6^*(\omega J_6^*) = \frac{1}{2}(x_i dx_{6n+i} - x_{n+i}dx_{7n+i} - x_{2n+i}dx_{3n+i} + x_{3n+i}dx_{2n+i} + x_{4n+i}dx_{5n+i} - x_{5n+i}dx_{4n+i} - x_{6n+i}dx_i + x_{7n+i}dx_{n+i}).$$

It is known that if $\Phi_{J_6^*}$ is a closed $K\ddot{a}hler$ form on Clifford $K\ddot{a}hler$ manifold (M,V), then $\Phi_{J_6^*}$ is also a symplectic structure on Clifford $K\ddot{a}hler$ manifold (M,V).

Take X. It is Hamilton vector field connected with Hamilton energy H and given by Eq(12).
Considering

$$\Phi_{J_6^*} = -d\lambda_{J_6^*} = dx_{n+i} \wedge dx_{7n+i} + dx_{2n+i} \wedge dx_{3n+i} + dx_{5n+i} \wedge dx_{4n+i} + dx_{6n+i} \wedge dx_i \quad (32)$$

Then from Eq (14) we obtained

If: $a = 0 \quad \Rightarrow \quad i_X = X^i \frac{\partial}{\partial x_i}$

$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^i \frac{\partial}{\partial x_i} dx_{n+i}.dx_{7n+i} - X^i \frac{\partial}{\partial x_i} dx_{7n+i}.dx_{n+i} + X^i \frac{\partial}{\partial x_i} dx_{2n+i}.dx_{3n+i} - X^i \frac{\partial}{\partial x_i} dx_{3n+i}.dx_{2n+i} + X^i \frac{\partial}{\partial x_i} dx_{5n+i}.dx_{4n+i} - X^i \frac{\partial}{\partial x_i} dx_{4n+i}.dx_{5n+i} + X^i \frac{\partial}{\partial x_i} dx_{6n+i}.dx_i - X^i \frac{\partial}{\partial x_i} dx_i.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{n+i}dx_{7n+i} - X^{7n+i}dx_{n+i} + X^{2n+i}dx_{3n+i} - X^{3n+i}dx_{2n+i} + X^{5n+i}dx_{4n+i} - X^{4n+i}dx_{5n+i} + X^{6n+i}dx_i - X^i dx_{6n+i}$$

If: $a = 1 \quad \Rightarrow \quad i_X = X^{n+i} \frac{\partial}{\partial x_{n+i}}$

$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{n+i}.dx_{7n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{7n+i}.dx_{n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{2n+i}.dx_{3n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{3n+i}.dx_{2n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{5n+i}.dx_{4n+i} - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{4n+i}.dx_{5n+i} + X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_{6n+i}.dx_i - X^{n+i} \frac{\partial}{\partial x_{n+i}} dx_i.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{n+i}dx_{7n+i} - X^{7n+i}dx_{n+i} + X^{2n+i}dx_{3n+i} - X^{3n+i}dx_{2n+i} + X^{5n+i}dx_{4n+i} - X^{4n+i}dx_{5n+i} + X^{6n+i}dx_i - X^i dx_{6n+i}$$

If: $a = 2 \quad \Rightarrow \quad i_X = X^{2n+i} \frac{\partial}{\partial x_{2n+i}}$

$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{n+i}.dx_{7n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{7n+i}.dx_{n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{2n+i}.dx_{3n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{3n+i}.dx_{2n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{5n+i}.dx_{4n+i} - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{4n+i}.dx_{5n+i} + X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_{6n+i}.dx_i - X^{2n+i} \frac{\partial}{\partial x_{2n+i}} dx_i.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{n+i}dx_{7n+i} - X^{7n+i}dx_{n+i} + X^{2n+i}dx_{3n+i} - X^{3n+i}dx_{2n+i} + X^{5n+i}dx_{4n+i} - X^{4n+i}dx_{5n+i} + X^{6n+i}dx_i - X^i dx_{6n+i}$$

⋮

If: $a = 7 \quad \Rightarrow \quad i_X = X^{7n+i} \frac{\partial}{\partial x_{7n+i}}$

$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{n+i}.dx_{7n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{7n+i}.dx_{n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{2n+i}.dx_{3n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{3n+i}.dx_{2n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{5n+i}.dx_{4n+i} - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{4n+i}.dx_{5n+i} + X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_{6n+i}.dx_i - X^{7n+i} \frac{\partial}{\partial x_{7n+i}} dx_i.dx_{6n+i} \Rightarrow$$
$$i_X\Phi_{J_6^*} = \Phi_{J_6^*}(X) = X^{n+i}dx_{7n+i} - X^{7n+i}dx_{n+i} + X^{2n+i}dx_{3n+i} - X^{3n+i}dx_{2n+i} + X^{5n+i}dx_{4n+i} - X^{4n+i}dx_{5n+i} + X^{6n+i}dx_i - X^i dx_{6n+i} \quad (33)$$

For all $a = 0,1,2,3,\dots,7$ we obtain equation (33).

Furthermore, the differential of Hamilton energy is obtained as follows:

$$dH = \frac{\partial H}{\partial x_i}dx_i + \frac{\partial H}{\partial x_{n+i}}dx_{n+i} + \frac{\partial H}{\partial x_{2n+i}}dx_{2n+i} + \frac{\partial H}{\partial x_{3n+i}}dx_{3n+i} + \frac{\partial H}{\partial x_{4n+i}}dx_{4n+i} + \frac{\partial H}{\partial x_{5n+i}}dx_{5n+i} + \frac{\partial H}{\partial x_{6n+i}}dx_{6n+i} + \frac{\partial H}{\partial x_{7n+i}}dx_{7n+i} \quad (34)$$

According to Eq(1) if equaled Eq(33) and Eq(34), the Hamilton vector field is calculated as follows:

$$X = -\frac{\partial H}{\partial x_{6n+i}}\frac{\partial}{\partial x_i} + \frac{\partial H}{\partial x_{7n+i}}\frac{\partial}{\partial x_{n+i}} + \frac{\partial H}{\partial x_{3n+i}}\frac{\partial}{\partial x_{2n+i}} - \frac{\partial H}{\partial x_{2n+i}}\frac{\partial}{\partial x_{3n+i}} -$$

$$\frac{\partial H}{\partial x_{5n+i}}\frac{\partial}{\partial x_{4n+i}}+\frac{\partial H}{\partial x_{4n+i}}\frac{\partial}{\partial x_{5n+i}}+\frac{\partial H}{\partial x_i}\frac{\partial}{\partial x_{6n+i}}-\frac{\partial H}{\partial x_{n+i}}\frac{\partial}{\partial x_{7n+i}} \quad (35)$$

Assume that a curve

$$\alpha : R \rightarrow M \quad (36)$$

Be an integral curve of the Hamilton vector field X, i.e. ,

$$X(\alpha(t)) = \dot{\alpha} \ , \ t \in R \quad (37)$$

In the local coordinates, it is found that

$$\alpha(t) = (x_i, x_{n+i}, x_{2n+i}, x_{3n+i}, x_{4n+i}, x_{5n+i}, x_{6n+i}, x_{7n+i}) \quad (38)$$

And

$$\dot{\alpha}(t) = \frac{dx_i}{dt}\frac{\partial}{\partial x_i}+\frac{dx_{n+i}}{dt}\frac{\partial}{\partial x_{n+i}}+\frac{dx_{2n+i}}{dt}\frac{\partial}{\partial x_{2n+i}}+\frac{dx_{3n+i}}{dt}\frac{\partial}{\partial x_{3n+i}}+\frac{dx_{4n+i}}{dt}\frac{\partial}{\partial x_{4n+i}}+\frac{dx_{5n+i}}{dt}\frac{\partial}{\partial x_{5n+i}}+\frac{dx_{6n+i}}{dt}\frac{\partial}{\partial x_{6n+i}}+\frac{dx_{7n+i}}{dt}\frac{\partial}{\partial x_{7n+i}} \quad (39)$$

Thinking out Eq(37) if equaled Eq(35) and Eq(39), it follows:

$$\frac{dx_i}{dt} = -\frac{\partial H}{\partial x_{6n+i}}, \frac{dx_{n+i}}{dt} = \frac{\partial H}{\partial x_{7n+i}}, \frac{dx_{2n+i}}{dt} = \frac{\partial H}{\partial x_{3n+i}}, \frac{dx_{3n+i}}{dt} = -\frac{\partial H}{\partial x_{2n+i}},$$

$$\frac{dx_{4n+i}}{dt} = -\frac{\partial H}{\partial x_{5n+i}}, \frac{dx_{5n+i}}{dt} = \frac{\partial H}{\partial x_{4n+i}}, \frac{dx_{6n+i}}{dt} = \frac{\partial H}{\partial x_i}, \frac{dx_{7n+i}}{dt} = -\frac{\partial H}{\partial x_{n+i}} \quad (40)$$

Hence, the equations obtained in Eq(40) are shown to be Hamilton equations with respect to component J_6^* of almost Clifford structure V^* on Clifford $K\ddot{a}hler$ manifold (M,V), and then the triple $(M, \Phi_{J_6^*}, X)$ is said to be a Hamilton mechanical system on Clifford $K\ddot{a}hler$ manifold (M,V).

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