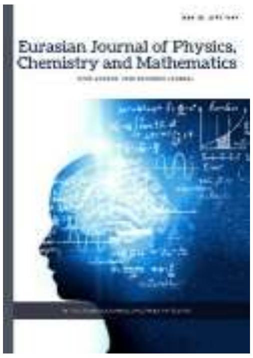

T^*C-Conharmonic curvature tensor of Almost Kahler Manifold

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ABSTRACT

This Research studied the T^*C −Conharmonic curvature tensor of almost kahler-manifold, where this research focuses on the geometrical feature or properties of the one of the almost kahler-manifold. We arrived at the following results:

- Demonstrated that this tensor in this manifold has the conventional Riemannian curvature symmetry features.
- The eight non-zero components' values are determined.
- Some results have been obtained, as well as, the correlation between the eight non-zero components of W2 manifold's tensor has been established
- Get a neutral equation for these components T^*C 0, T^*C1, T^*C2, T^*C3, T^*C4, T^*C5, TC^*6, T^*C7, of almost kahler is haler manifold

Keywords: T^*C − Conharmonic curvature tensor , almost kahler manifold (W2-manifold)

1. Introduction

An almost Hermitian structure is one of the most interesting works of the differential geometry, and The study of conformal transformations of Riemannien structures is an interesting subject in differential geometry. The conhormonic curvature tensor is invariant under the transforms ageodesic circle Ishi Y. [7] in 1957, has studied conharmonic transformation which is conformal transformation. In 1993 [2], the sixteen classes of almost Hermitian have been reclassified by Banaru, where Barnau utilize the structure and the Virtual for this reclassification, which became known as Kirichenko's tensors [13]. As for Majed is studied the Conharmonic curvature tensor of almost Kahler manifold , in 2021, Elham Mawlood Mohammed [4] studied "The Generalized Conharmonic Curvature Tensor of The Locally Conformal Kahler Manifold", as well as, in 2018, Dhabiaa [3], investigate "on curvature tensor of nearly kahler manifold and almost generalized canharmonic Hermitian manifold.

In this paper, Two important classes or categories of the almost Hermitian manifold have been studied, which are known as the almost Kahler manifold class of almost kahler manifold, where W2 denoted to the almost kahler manifold.

Preliminaries

Assume that g and $\hat{g}$ are to be the two Riemannian metrics on smooth manifold M , so that on M given a conformal transformation metric if there is a smooth function $f \in C^{\infty}(M)$ such that $\hat{g} = e^{2f}\ g$.

Assume {M, J, g =<.>} is to be an AK(Almost Khlaer)-manifold , if there exists a conformal

transformation of the metric g into the metric $\hat{g}$, then { M,J , $\hat{g} = e^{2f}\ g$ }will be AK(Almost Khlaer)-manifold .

In this case, we say that on smooth manifold M given conformal transformation of AK(Almost Khlaer)-structure on a manifold M the pair (J,g), where J-almost complex structure (J^2=id) on M,g=<.,.>-(pseudo) Riemannian metric on M .In this case <JI,JL> =<I,L> ;I,L∈I(M).

Definition 1 .1 [6]

An AK(Almost Khlaer)-manifold $\{M, J, g = <.,.>\}$ is said to be an almost kahler structure (AK-structure) if the fundamental form Ω(I,L)=<I,JL> is closed , i.e. dΩ =0 .a smooth manifold M with AK-structure is named an almost kahler manifold (AK-manifold) .

Definition 1 .2 [5]

The Riemannian Curvature tensor on AH(Almost Hermition)-manifold M is a tensor of type (4.0) which is expressed by the following formulas:

$R(\mathrm{I,L,V,U}) = \frac{1}{16}\{3\,[\mathrm{R(I,L,V,U)} + \mathrm{R(JI,JL,V,U)} + \mathrm{R(I,L,JV,JU)} + \mathrm{R(JI,JL,JV,JU)}] - \mathrm{R(I,V,JU,JL)} - \mathrm{R(JI,JV,U,L)} - \mathrm{R(I,U,JL,JV)} - \mathrm{R(JI,JU,L,V)} + \mathrm{R(JI,V,JU,L)} + \mathrm{R(I,JV,U,JL)} + \mathrm{R(JI,U,L,JV)} + \mathrm{R(I,JU,JL,V)}]$

where R(I, L, V, U) presents the Riemannian curvature tensor.

(I, L, V, U) ∈ Tp (M) and satisfies the below features or properties:

1) $R(\mathrm{I,L,V,U}) = -R(\mathrm{L,I,V,U}) = -R(\mathrm{I,L,U,V})$

2) $R(\mathrm{I,L,V,U}) = R(\mathrm{V,U,I,L})$

3) $R(\mathrm{I,L,V,U}) + R(\mathrm{I,V,U,L}) + \mathrm{R(I,U,L,V)} = 0$

4) $\mathrm{R(I,JI,JI,I)} = R(I, JI, JI, I)$

The components of the Riemannian Curvature tensor on AH(Almost Hermition)- manifold are given via the next theorem.

Proposition 1.3 [8]

The components of Riemannian curvature tensor of AK-manifold in the adjoint G- structure space are:

1. $R^{a}_{bcd} = 2B^{a}_{bcd}$ 2. $R^{a}_{b\hat{c}d} = 4B^{cah}B_{dbh} - A^{ac}_{bd} - 2B^{ach}B_{hbd}$
3. $R^{a}_{bc\hat{d}} = A^{ad}_{bc} + 2B^{adh}B_{hbc} - 4B^{dah}B_{cbh}$ 4. $R^{a}_{b\hat{c}\hat{d}} = 2B^{adh}_{b}$
5. $R^{\hat{a}}_{\hat{b}cd} = -2B^{b}_{acd}$ 6. $R^{\hat{a}}_{\hat{b}\hat{c}d} = A^{bc}_{ad} + 2B^{bch}B_{had} - 4B^{cbh}B_{dah}$
7. $R^{\hat{a}}_{\hat{b}c\hat{d}} = 4B^{dbh}B_{cah} - A^{bd}_{ac} - 2B^{bdh}B_{hac}$ 8. $R^{\hat{a}}_{\hat{b}\hat{c}\hat{d}} = -B^{bcd}_{a}$
9. $R^{a}_{\hat{b}cd} = 4B^{hab}B_{hcd}$ 10. $R^{a}_{\hat{b}\hat{c}d} = -2B^{cab}_{d}$
11. $R^{a}_{\hat{b}c\hat{d}} = 2B^{dab}_{c}$ 12. $R^{a}_{\hat{b}\hat{c}\hat{d}} = -4B^{[c|ab|d]}$
13. $R^{\hat{a}}_{bcd} = -4B_{[c|ab|d]}$ 14. $R^{\hat{a}}_{b\hat{c}d} = 2B^{c}_{dab}$
15. $R^{\hat{a}}_{bc\hat{d}} = -2B^{d}_{cab}$ 16. $R^{\hat{a}}_{b\hat{c}\hat{d}} = 4B^{hcd}B_{hab}$

Definition 1.4 [10]

Ricci tensor is tensor of tybe (2,0) which is defined by : $r_{ab} = R^{c}_{abc} = g^{cd}R_{cabd}$.

Theorem 1.5 [2]

In the adjacent structure space G, the components of the Ricci tensor for the AKmanifold are given by the following figures :

1) $r_{ab} = 4B^{c}_{(ab)c}$.
2) $r_{\hat{a}\hat{b}} = 4B_{c}^{(ab)c}$.
3) $r_{\hat{a}b} = -4B^{hab}B_{hcb} - A^{ac}_{cb} - 2B^{ach}B_{hcb} + 4B^{cah}B_{bch}$.
4) $r_{a\hat{b}} = -4B^{hcb}B_{hca} - A^{bc}_{ca} - 2B^{bch}B_{hca} + 4B^{cbh}B_{ach}$.

Remark 1.6 [3]

1)By the Banaru' s classification of AH-manifold , the class AK-manifold verification the conditions as it comes $B^{ab}_{c} = B^{c}_{ab} = = 0$, $B^{(abc)} = B_{(abc)} = 0$

2) The value of the Rimannian scale is given in the form g:

i) $g_{ab} = 0$.
ii) $g_{\hat{a}\hat{b}} = 0$.
iii) $g_{\hat{a}b} = \delta^{a}_{b}$.
iv) $g_{a\hat{b}} = \delta^{b}_{a}$

Definition 1.7 [12]

Assume that g and $\tilde{g}$ are to be the two Riemannian metric on smooth manifold M , so that on M given a conformal transformation metric if there is a smooth function $f \in C^{\infty}(M)$ such that $\tilde{g} = e^{2f} g$.

Definition1 .8 [3]

Assume (M, J, g) – AK manifold, the curvature conhatmonic tensor of type C (3,1) on n- dimensional Riemannian manifold, obtained or established via below formula:

$$T^{*}(I,L,V) = R(I,L,V) - \frac{r}{2(n-1)(2n-1)}[g(L,V)I - g(I,V)L \ ]$$

Where R presents the general Riemann curvature tensor,
r is the scalar curvature.
g is Riemannian metric .

Definition 1.9

Assume (M, J, g) – AK manifold, A $T^{*}C -$ conhatmonic curvature tensor of type C (4,0) on n-dimensional Riemannian manifold, n≠1 obtained via below formula:

$$T^{*}C(I,L,V,U) = R(I,L,V,U) - \frac{r}{2(n-1)(2n-1)}[g(L,V)\, g(I,U) - g(I,V)\, g(L,U) \ ]$$

Where R presents the general Riemann curvature tensor,
r is the scalar curvature.
g is Riemannian metric

Properties 1.10

Thus T^{*} - conharmonic curvature tensor satisfies all the properties or features of algebraic curvature tensor:

1) $T^{*}C$ (*I,L,V,U*) = – $T^{*}C$ (*L, I , V,U*) ;
2) $T^{*}C$ (I,L,V,U) = - $T^{*}C$ (I,L,U,V) ;
3) $T^{*}C$ (*I,L,V,U*) + $T^{*}C$ (*L, V, I, U*) + $T^{*}C$ (*V, I, L, U*) = 0 ;
4) $T^{*}C$ *(I,L,V,U)*= $T^{*}C$ *(V,U,I,L);I,L,V,U* ∈*I(M)*.

Proof*:* :- we will demonstrate (1)

1) $T^{*}C(I,L,V,U) = R(I,L,V,U) + \frac{r}{2(n-1)(2n-1)}[g(I,U)g(L,V) - g(I,V)g(L,U)] - \frac{r}{2(n-1)(2n-1)}[g(L,V)g(I,U) - g(L,U)g(I,V)] = -R(L,I,V,U) + \frac{r}{2(n-1)(2n-1)}[-g(I,U)g(L,V) + g(I,V) + g(L,U)] + \frac{r}{2(n-1)(2n-1)}[-g(L,V)g(I,U) + g(L,U)g(I,V)] = -T^{*}\mathrm{C}\,(L,I,V,U)$.

Properties are similarly demonstrated :

2) $T^{*}C$ (I,L,V,U) = - $T^{*}C$ (I,L,U,V);
3) $T^{*}C$ (I,L,V,U) + $T^{*}C$ (L,V,I,U) + $T^{*}C$ (V,I,L,U) = 0.

4) T^*C (I,L,V,U) = - T^*C (V,U,I.L);

The Covarient T^* concircular Curvatare T^* type (3,1) have form
T^*C (I,L)V =R (I,L)V$-\frac{r}{2(n-1)(2n-1)}\{<I,V>L-<L,V>I\}$
Where R is the Riemannian curvature tensor U, I ,L,V $\in I(M)$
via definition of the spectrum tensor.
T^*C(I,L)V= $T^*C_0(I,L)V$+$T^*C_1(I,L)V$+ $T^*C_2(I,L)V$+$T^*C_3(I,L)V$+$T^*C_4(I,L)V$+$T^*C_5(I,L)V$+$T^*C_6(I,L)V$+ $T^*C_7(I,L)V$; $I,L, \in I(M)$.

tensor $T^*C_0(I,L)V$ as nonzero-The component have only components of the form $\{T^*C^a_{0\ bcd}\ ,T^{*\hat{a}}_{0\ \ \hat{b}\hat{c}\hat{d}}\}=\{T^*C^a_{bcd}\ ,T^*C^{\hat{a}}_{\hat{b}\hat{c}\hat{d}}\}$;
tensor $T^*C_1(AK)(I,L)V$ - components of the form $\{T^*C^a_{1\ bc\hat{d}}\ ,T^*C^{\hat{a}}_{1\ \hat{b}\hat{c}d}\}=\{T^*C^a_{bc\hat{d}}\ ,T^*\ C^{\hat{a}}_{\hat{b}\hat{c}d}\}$;
tensor $T^*C_2(AK)(I,L)V$ - components of the form $\{T^*C^a_{2\ b\hat{c}d}\ ,T^*C^{\hat{a}}_{2\ \hat{b}c\hat{d}}\}=\{T^*C^a_{b\hat{c}d}\ ,T^*\ C^{\hat{a}}_{\hat{b}c\hat{d}}\}$;
tensor $T^*C_3(I,L)V$ - components of the form $\{T^*C^a_{3\ b\hat{c}\hat{d}}\ ,T^*C^{\hat{a}}_{3\ \hat{b}cd}\}=\{T^*C^a_{b\hat{c}\hat{d}}\ ,T^*C^{\hat{a}}_{\hat{b}cd}\}$;
tensor$T^*\ C_4(I,L)V$ - components of the form$\{\ T^*C^a_{4\ \hat{b}cd},T^*C^{\hat{a}}_{4\ \ b\hat{c}\hat{d}}\}=\{T^*C^a_{\hat{b}cd},T^*\ C^{\hat{a}}_{b\hat{c}\hat{d}}\}$;
tensor $T^*C_5(I,L)V$ - components of the form $\{T^*C^a_{5\ \hat{b}c\hat{d}},T^*C^{\hat{a}}_{5\ \ b\hat{c}d}\}=\{T^*C^a_{\hat{b}c\hat{d}},T^*C^{\hat{a}}_{b\hat{c}d}\}$;
tensor $T^*C_6(I,L)V$ - components of the form $\{T^*C^a_{6\,\hat{b}\hat{c}d},T^*C^{\hat{a}}_{6\ \ bc\hat{d}}\}=\{T^*C^a_{6\ \ \hat{b}\hat{c}d},T^*C^{\hat{a}}_{6\ \ bc\hat{d}}\}$;
tensor $T^*C_7(AK)(I,L)V$ - components of the form$\{T^*C^a_{7\ \ \hat{b}\hat{c}\hat{d}},T^*C^{\hat{a}}_{7\ \ bcd}\}=\{T^*C^a_{\hat{b}\hat{c}\hat{d}},T^*C^{\hat{a}}_{bcd}\}$.
Tensors$T^*C_0=T^*C_0(I,L)V,\ T^*C_1=T^*C_1(I,L)V,\dots,T^*C_7=T^*C_7(I,L)V$.
The basic invariants T^* $-$conharmonic AK-manifold will be named.

Definition 3.3

AK(Almost Kahler)-manifold for which $T^*C_i(AK)=0$ is AK(Almost Kahler)-manifold of class$T^*\ C_i(AK)$, i=0, 1, …., 7.

Theorem 1.11

1) $AH-$ manifold of class $T^*\ C_0(AK)$ characterized via identity
$T^*(I,L)V-T^*(I,JL)JV-T^*(JI,L)JV-T^*(JI,JL)V-JT^*(I,L)JV-JT^*(I,JL)V-JT^*(JI,L)V+JT^*(JI,JL)JV=0$, $I,L,V\in I(M)$.
2) AH –manifold of class $T^*\ C_1(AK)$ characterized via identity $T^*(I,L)V+T^*(I,JL)JV-T^*(JI,L)JV+T^*(JI,JL)V+JT^*(I,L)JV-JT^*(I,JL)V-JT^*(JI,L)V-JT^*(JI,JL)JV=0$, $I,L,V\in I(M)$.
3) AH - manifold of class$T^*\ C_2$characterized via identity
$T^*(I,L)V-T^*(I,JL)JV+T^*(JI,L)JV+T^*(JI,JL)V-JT^*(I,L)JV-JT^*(I,JL)V+JT^*(JI,L)V-JT^*(JI,JL)JV=0$, $I,L,V\in I(M)$.

4) AH - manifold of class $T^*\ C_3(AK)$ characterized via identity
$T^*(I,L)V+T^*(I,JL)JV+T^*(JI,L)JV-T^*(JI,JL)V-JT^*(I,L)JV+JT^*(I,JL)V+JT^*(JI,L)V+JT^*(JI,JL)JV=0$; $I,L,V\in I(M)$.
5) AH- manifold of class $T^*\ C_4(AK)$ characterized via identity
$T^*(I,L)V+T^*(I,JL)JV+T^*(JI,L)JV-T^*(JI,JL)V+JT^*(I,L)JV-JT^*(I,JL)V-JT^*(JI,L)V-JT^*(JI,JL)JV=0$; $I,L,V\in I(M)$.
6) AH - manifold of class $T^*C_5(AK)$ characterized via identity
$T^*(I,L)V-T^*(I,JL)JV+T^*(JI,L)JV+T^*(JI,JL)V+JT^*(I,L)JV+JT^*(I,JL)V-JT^*(JI,L)V+JT^*(JI,JL)JV=0$; $I,L,V\in I(M)$.
7) AH- manifold of class $T^*C_6(AK)$ characterized via identity
$T^*(I,L)V+T^*(I,JL)JV-GC(AK)(JI,L)JV+T^*(JI,JL)V+JT^*(I,L)JV-JT^*(I,JL)V+JT^*(JI,L)V+JT^*(JI,JL)JV=0$; $I,L,V\in I(M)$.
8) AH - manifold of class$T^*\ C_7(AK)$ characterized via identity
$T^*(I,L)V-T^*(I,JL)JV-T^*(JI,L)JV-T^*(JI,JL)V+JT^*(I,L)JV+JT^*(I,JL)V+JGC(AK)(JI,L)V-JT^*(JI,JL)JV=0$; $I,L,V\in I(M)$.

Proof:-

1) Let AH- manifold of class $T^*(C_0$ (AK), the manifold of class $T^*C_0(AK)$ characterized via a condition $T^*C(AK)_{0\ bcd}^{a} = 0$, or $T^*C(AK)_{bcd}^{a} = 0$.

i.e. $\left[T^*C(AK)\left(\varepsilon_c, \ \varepsilon_d\ \right)\varepsilon_b\right]^a \varepsilon_a$.

As σ- a projector on $D_J^{\sqrt{-1}}$, that $\sigma \circ \{T^*C(AK)(\sigma I, \sigma L)\sigma V\} = 0$;

i.e (id-$\sqrt{-1}$ J)$\{T^*C(AK)(I - \sqrt{-1}\,JI, L - \sqrt{-1}\,JL)(V - \sqrt{-1}\,JV)\ \}$ = 0.

Removing the brackets can be received:

i.e.

$T^*(I,L)V$-$T^*(I,JL)JV$-$T^*(JI,L)JV$-$T^*(JI,JL)V$-$T^*(I,L)JV$-$JT^*(I,JL)V$-$JT^*(JI,L)V$+$JT^*(JI,JL)JV$-$\sqrt{-1}$ $\{T^*(I,L)JV$+$T^*(I,JL)V$+$T^*(JI,L)V$ - $T^*(JI,JL)JV\}$- $\{JT^*(I,L)V$-$JT^*(I,JL)JV$-$JT^*(JI,L)JV$-$JT^*(JI,JL)V\}$ = 0 .

i.e

1) $T^*(I,L)V$-$T^*(I,JL)JV$-$T^*(JI,L)JV$-$T^*(JI,JL)V$-$JT^*(I,L)JV$-$JT^*(I,JL)V$-$JT^*(JI,L)V$+$JT^*(JI.JL)JV$=0;
2) $T^*(I,L)JV$+$T^*(I,JL)V$+$T^*(JI,L)V$–$T^*(JI,JL)JV$+$JT^*(I,L)V$–$JT^*(I,JL)JV$– $JT^*(JI,L)JV$ – $JT^*(JI,JL)JV$ = 0.

These equalities (3.3.12) and (3.3.13) are the same. The first replacement V on JV yields the second equality.

Therefore, AH(Almost Hermition)- manifold of class $T^*C_0(AK)$ characterized via identity.

$T^*(I,L)\ V - T^*(I,JL)JV - T^*(JI,L)JV - T^*(JI,JL)V - JT^*(I,L)JV - JT^*(I,JL)\ V -$
$JT^*(JI,L)\ V + JT^*(JI,JL)JV = 0$, $\ I,L,V \ \in\ I(M)$.

Similarly considering AH - manifold of classes $T^*C_1(AK)$- GC_7(AK) can be received the 2,3,4,5,6,7 and 8.

Theorem 1.12

The components or the elements of the T^*-conharmonic tensor of AK-manifold in the adjoined G-structure

$$T^*C_{ijkl} = R_{ijkl} + \frac{r}{2(n-1)(2n-1)}[g_{ik}\ \ g_{jl} - \ g_{il}\ \ g_{jk}\ ]$$

Proof :

a) Consider l =d, i = a, k = c, j = b.

$$T^*C_{abcd} = R_{abcd} + \frac{r}{2(n-1)(2n-1)}[g_{ac}\ \ g_{bd} - g_{ad}\ \ g_{bc}\ ]$$

$$T^*C_{abcd} = -4B_{[c|ab|d]} + \frac{r}{2(n-1)(2n-1)}\{(0)(0)\text{-}(0)(0)\}$$

$$T^*C_{abcd} = -4B_{[c|ab|d]}$$

b) Consider l = d, i = $\hat{a}$, k = c , j = b.

$$T^*C_{\hat{a}bcd} = R_{\hat{a}bcd} + \frac{r}{2(n-1)(2n-1)}[g_{\hat{a}c}\ \ g_{bd} - g_{\hat{a}d}\ \ g_{bc}\ ]$$

$$T^*C_{\hat{a}bcd} = 2B_{bcd}^{a} + \frac{r}{2(n-1)(2n-1)}[\delta_c^a(0) - \delta_d^a\ (0)]$$

$$T^*C_{\hat{a}bcd} = 2B_{bcd}^{a}$$

c) Consider l = $\hat{d}$., i = a, k = c, j =b

$$T^*C_{abc\hat{d}} = R_{abc\hat{d}} + \frac{r}{2(n-1)(2n-1)}[g_{ac}\ \ g_{b\hat{d}} - g_{a\hat{d}}\ \ g_{bc}\ ]$$

$$T^*C_{abc\hat{d}} = 4B^{dbh}B_{cah} - A_{ac}^{bd} - 2B^{bdh}B_{hac} + \frac{1}{2(n-1)}\ [\ \delta_b^d\ (0) - \ \delta_a^d\ (0)]$$

$$T^*C_{abc\hat{d}} = 4B^{dbh}B_{cah} - A_{ac}^{bd} - 2B^{bdh}B_{hac}$$

d) Consider l =d, i = a, k=$\hat{c}$, j = b.

$$T^*C_{ab\hat{c}d} = R_{ab\hat{c}d} + \frac{r}{2(n-1)(2n-1)}[g_{a\hat{c}}\ \ g_{bd} - g_{ad}\ \ g_{b\hat{c}}\ ]$$

$$T^*C_{ab\hat{c}d} = A_{ad}^{bc} + 2B^{bch}B_{had} - 4B^{cbh}B_{dah} + \frac{r}{2(n-1)(2n-1)}\ [\ \delta_a^c(0) - \ \delta_b^c\ (0)]$$

$T^{*}C_{ab\hat{c}\hat{d}} = A^{bc}_{ad} + 2B^{bch}B_{had} - 4B^{cbh}B_{dah}$

e) Consider l =d, i = a, k = c, j=$\hat{b}$.

$T^{*}C_{a\hat{b}cd} = R_{a\hat{b}cd} + \frac{r}{2(n-1)(2n-1)}[g_{ac}\ \ g_{\hat{b}d} - g_{ad}\ \ g_{\hat{b}c}\ ]$

$T^{*}C_{a\hat{b}cd} = -2B^{b}_{acd} + \frac{r}{2(n-1)(2n-1)}\ [\ \delta^{b}_{d}(0)\ -\delta^{b}_{c}(0)]$

$T^{*}C_{a\hat{b}cd} = -2B^{b}_{acd}$

f) Consider l = d, i =$\hat{a}$, k = c, j = $\hat{b}$

$T^{*}C_{\hat{a}\hat{b}cd} = R_{\hat{a}\hat{b}cd} + \frac{r}{2(n-1)(2n-1)}[g_{\hat{a}c}\ \ g_{\hat{b}d} - g_{\hat{a}d}\ \ g_{\hat{b}c}\ ]$

$T^{*}C_{\hat{a}\hat{b}cd} = 4B^{hab}B_{hcd} + \frac{r}{2(n-1)(2n-1)}\ [\ \delta^{a}_{c}\delta^{b}_{d}\ -\delta^{a}_{d}\ \delta^{b}_{c}\ ]$

g) Consider l = d, i = $\hat{a}$, j = b, k = $\hat{c}$.

$T^{*}C_{\hat{a}b\hat{c}d} = R_{\hat{a}b\hat{c}d} + \frac{r}{2(n-1)(2n-1)}[g_{\hat{a}\hat{c}}\ \ g_{bd} - g_{\hat{a}d}\ \ g_{b\hat{c}}\ ]$

$T^{*}C_{\hat{a}b\hat{c}d} = 4B^{cah}B_{dbh} - A^{ac}_{bd} - 2B^{ach}B_{hbd} + \frac{r}{2(n-1)(2n-1)}[\ (0)(0) - \delta^{a}_{d}\ \ \delta^{c}_{b}\ ]$

$T^{*}C_{\hat{a}b\hat{c}d} = 4B^{cah}B_{dbh} - A^{ac}_{bd} - 2B^{ach}B_{hbd} - \frac{r}{2(n-1)(2n-1)}[\ \delta^{a}_{d}\ \ \delta^{c}_{b}$

h) Consider l = $\hat{d}$, i = $\hat{a}$, k = c, j=b.

$T^{*}C_{\hat{a}bc\hat{d}} = R_{\hat{a}bc\hat{d}} + \frac{r}{2(n-1)(2n-1)}[g_{\hat{a}c}\ \ g_{b\hat{d}} - g_{\hat{a}\hat{d}}\ \ g_{bc}\ ]$

$T^{*}C_{\hat{a}bc\hat{d}} = A^{ad}_{bc} + 2B^{adh}B_{hbc} - 4B^{dah}B_{cbh}\ + \frac{r}{2(n-1)(2n-1)}[\ \delta^{a}_{c}\ \ \delta^{d}_{b}\ - (0)(0)]$

$T^{*}C_{\hat{a}bc\hat{d}} = A^{ad}_{bc} + 2B^{adh}B_{hbc} - 4B^{dah}B_{cbh}\ + \frac{r}{2(n-1)(2n-1)}[\ \delta^{a}_{c}\ \ \delta^{d}_{b}]$

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تنزر الانحناء الكونـهومني المعمم لمنطوي كاهلر التقريبي

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الملخص

في هذا البحث قمنا بدراسة تنزر الانحناء الكونهومني T^* لمنطوي كوهلر التقريبي ,
وايجاد الخصائص الهندسية لاحدى بنى المنطي الهرميتي والذي يرمز له بالرمز w_2 حيث يشير الى منطوي كاهلر التقريبي , ان النتائج الرئيسية لهذه الدراسه المذكوره يمكن تلخيصها وتوضيحها ادناه :

1) ثبت ان هذا التنزر يمتلك خصائص التناظر الكلاسيكي للانحناء الريماني .

2)حساب مكونات التنزر الكونهومني في T^* منطوي كوهلر التقريبي .

3)الحصول على بعض النتائج وايجاد علاقات بين مكونات التنزر في هذا المنطوي.

4) الحصول على معادلة محايدة لكل T^*C 1, T^*C2, T^*C3, T^*C4, T^*C5, T^*C6, T^*C7,T^*C .0 في منطوي كوهلر التقريبي.