日本数学会

2007年度年会

幾何学分科会
講演アブストラクト

2007年3月

埼玉大学

第1日　3月27日 (火)

9:50~12:00

1	大藪　卓		構造定理 (Statement of the results), 他4件	10
2	前田　陽一	(東海大理)	* 4次元の目で見た立体角 visual steradian について	10
3	佐藤　健治	(玉川大工)	* 高次元の立体角 ~ 外角どうしの関係について ~	10
4	井川　俊彦 E.Guler	(明海大歯) (Anatolian school,TURKEY)	* Bour's theorem with lightlike axis in R^3_1	10
5	杉山　儀	(名工大情報)	* 曲線の曲率の対数微分を保存する等長はめ込み	10
6	村田　里子 梅原　雅顕	(京都橘高) (阪大理)	* 3次元 Euclid 空間の平坦な波面について	15
7	伊藤　仁一 C.Vi lcu	(熊本大教育) (IMAR(Bucharest))	* On the lengths of simple closed (quasi) geodesics on convex surfaces	15
8	安藤　直也	(熊本大自然)	* 曲面の曲率線の測地的曲率について	15
9	小林　真平	(東京電気大情報)	* Real forms of complex surfaces of constant mean curvature	15
10	田中　實 近藤　慶	(東海大理) (東海大理)	* 全曲率, 放射曲率, ミルナー予想	10
11	長谷川　和志	(東京理大理)	* Stability of twistor lifts for surfaces in Euclidean space	10

14:00~15:10

12	剱持　勝衛	(東北大)	* 周期的平均曲率をもつ回転超曲面について	15
13	加藤　正夫		* アファイン極小線織超曲面の中心写像	10
14	Hui　Ma 大仁田　義裕	(中国・清華大) (阪市大理)	* Classification of homogeneous Lagrangian submanifolds in complex hyperquadrics	15
15	黒須　早苗	(首都大東京理工)	* (1,1)-geodesic アファインはめ込みの退化次数による特徴付け	10
16	小池　直之	(東京理大理)	* 擬リーマン多様体間の写像の複素化とアンチケーラー幾何	10
17	小池　直之	(東京理大理)	* プロパー複素等焦部分多様体の完備な複素化の構成法とその構造	10

15:30~16:30　特別講演

小野　肇　(東工大)　* トーイック佐々木・アインシュタイン計量の存在と一意性について

第2日　3月28日 (水)

10:00~12:00

18	栗原　博之 東條　晃次	(埼玉短期大) (千葉工大)	* コンパクト Riemann 4-対称空間の対合について	15
19	阿賀岡　芳夫 兼田　英二	(広大理) (大阪外大)	* エルミート対称空間 $Sp(n)/U(n)$ の正準等長埋め込みの剛性	10

Bour's theorem with lightlike axis in R_1^3

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It is well known that the right helicoid (resp. catenoid) is the only ruled (resp. rotation) surface which is minimal in Euclidean space. And, these surfaces have interesting properties. That is, they are both members of a one−parameter family of isometric surfaces. Moreover, by this isometric transformation, the minimality is preserved.

We can generalize this one−parameter family of isometric surfaces to a minimal surface and its conjugate one on the Weierstrass-Enneper representation for minimal surfaces. This generalization is focused on the minimality.

On the other hand, if we focuse on the ruled and rotational characters, we have the following generalization.

Bour's Theorem. *A generalized helicoid is isometric to a rotation surface so that helices on the helicoid correspond to parallel circles on the rotation surface*

In this generalization, original property that they are minimal is not generally kept.

So, in [2], we determined pairs of surfaces of Bour's theorem with an additional condition that they have same Gauss map.

Moreover, we considered Bour's theorem in Minkowski 3−space.

We can classify generalized helicoid and rotation surface in R_1^3 by types of axis and profile curve, and write as (axis's type, profile curve's type)−type; for example, (S,T)−type means that the surface has a spacelike axis and a timelike profile curve.

In [3], we studeied Bour's theorem of (S,S), (S,T), (T,S) and (T,T)−type surfaces. Moreover, (L,S) and (L,T)-type are studied in [1].

Continuing from these old results, we study a (L,L)−type (i.e., (lightlike, lightlike)-type) generalized helicoid and rotation surface, and we have following results.

Theorem 1. *A timelike generalized helicoid*

$$H(u,v) = (-2uv, c + u - uv^2 + av, c - u - uv^2 + av)$$

is isometric to a timelike rotation surface

$$R(u,v) = (-4uv + 2a, c - \frac{a^2}{u} - 2uv^2 + 2av + 2u, c - \frac{a^2}{u} - 2uv^2 + 2av - 2u)$$

so that helices on the generalized helicoid correspond to parallel circles on the rotation surface.

Theorem 2. *The mean curvatures of the helicoidal and rotation surfaces in Theorem 1 are different definitely.*

Corollary 1. *The relation of Gauss maps between two surfaces in Theorem 1 is given by*

$$e_R + \sqrt{2}e_H = \sqrt{2}\Phi(u) \qquad (1)$$

where $\Phi(u) = (-a, \frac{a^2}{8u}, \frac{a^2}{8u})$.

Corollary 2. *The relation of non-zero constant mean curvatures between two surfaces of Theorem 1 is given by*

$$H_H = \sqrt{2}H_R. \qquad (2)$$

Theorem 3. *The second mean curvature and the Gaussian curvature of a helicoidal surface of* (L,L) *– type are related by following equation*

$$H_{II}^2 = K \qquad (3)$$

in Minkowski $3-$*space, where* $\varphi(u) = c$, $c \in R$, $a \in R \setminus \{0\}$.

Theorem 4. *The second Gaussian curvature of the helicoidal surfaces of* (L,L) *– type is*

$$K_{II} = 0 \qquad (4)$$

in Minkowski $3-$*space, where* $\varphi(u) = c$, $c \in R$, $a \in R \setminus \{0\}$.

References

[1] E. Güler and A. Turgut Vanli, Bour's theorem in Minkowski 3–space, J. Math. Kyoto University, 46 No.1 (2006), 47–63.

[2] T. Ikawa, Bour's theorem and Gauss map, Yokohama Math. J. 48 (2000), 173–180.

[3] T. Ikawa, Bour's theorem in Minkowski geometry, Tokyo J. Math. 24 (2001), 377–394.