TOKYO J. MATH.
VOL. 18, NO. 1, 1995

Isometric Deformation of Surfaces in the Hyperbolic 3-Manifold Preserving the Mean Curvature

Hiroshi TAKEUCHI

Shikoku University

(Communicated by Y. Maeda)

1. Introduction.

Let $(N^3(c), h)$ be a complete simply connected Riemannian 3-manifold of constant curvature c with metric h. Let $X : M \to N^3(c)$ be an isometric immersion of a Riemannian 2-manifold M into $N^3(c)$ and H the mean curvature of X. The isomertic immersion X is called *H-deformable* if there exists a non-trivial 1-parameter family of immersions X_t such that

(1) $$X_0 = X\,,$$

(2) $$X_t^* h = X_0^* h\,,$$

(3) $$H_t = H\,,$$

where H_t denotes the mean curvature of X_t. An H-deformation $\{X_t\}$ is trivial if for each parameter t, there exists an isometry L of $N^3(c)$ such that $X_t = L \circ X_0$. An isometric immersion X is called *locally H-deformable* if each point of M has a neighborhood restricted to which X is H-deformable.

There are some papers on the H-deformable surfaces in Euclidean 3-space. O. Bonnet [1] proved that a surface of constant mean curvature in Euclidean space can be locally isometrically deformed preserving the mean curvature. É. Cartan [4] has studied such deformations for surfaces of nonconstant mean curvature and showed that they are W-surfaces. Chen and Peng [5] and K. Kenmotsu [8] characterized in some detail the Riemannian metrics and the mean curvature functions of the surfaces. Colares and Kenmotsu [7] and Roussos [14] proved that if a surface of constant Gaussian curvature in Euclidean 3-space is locally H-deformable, then the Gaussian curvature must be zero and such a deformation starts from a cylinder over a logarithmic spiral. Kokubu [9] studied such a deformation of hypersurfaces in Euclidean n-space ($n \geq 3$).

Received February 4, 1994
Revised September 5, 1994