1051-53-58 **Taechang Byun*** (tcbyun@math.ou.edu), Department of Mathematics, University of Oklahoma, Norman, OK 73019. *Horizontal displacement of curves in bundle $SO(3) \to SO_0(1,3) \to \mathbb{H}^3$.* Preliminary report.

Consider the principal bundle $\mathrm{SO}(n) \longrightarrow \mathrm{SO}_0(1,n) \xrightarrow{\pi} \mathbb{H}^n$, where π is a Riemannian submersion. Let γ be a simple closed curve in the base $\mathbb{H}^n$, bounding an embedded disk S. We are concerned with the horizontal lift of γ starting at $e \in \mathrm{SO}(n)$. The horizontal displacement for γ gives rise to a point p in the fiber $\mathrm{SO}(n)$.

When $n = 2$, it was known that the distance between e and $p \in \mathrm{SO}(2)$ is the same as the area of the S. We study the case when $n = 3$. The surface S enables us to find a curve f connecting e and p in $\mathrm{SO}(3)$, whose length is exactly the area of the surface S. In addition, on a dense subset of the domain of f, the left translations of the tangent vectors $\dot{f}(t)$ to e will be related to the curvature of the connection of the principal bundle $\mathrm{SO}(1,3) \to \mathbb{H}^3$ with respect to the 2-dimensional horizontal distribution in $\mathrm{SO}(1,3)$, induced from the tangent planes of S in $\mathbb{H}^3$. (Received August 10, 2009)