# Extrinsically flat surfaces of space forms and the geometric structure on the space of oriented geodesics

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It is well known that any complete *extrinsically flat* surface in the 3-sphere $S^3$ must be totally geodesic, where "extrinsically flat" means vanishing of the Gauss-Kronecker curvature. However, if one admits some singularities, there are many non-trivial complete extrinsically flat surfaces in $S^3$. In this talk, we shall introduce *a representation formula for extrinsically flat surfaces in* $S^3$ in terms of a pair of two curves in the 2-sphere $S^2$.

The main idea for the representation formula is the correspondence between ruled surfaces in $S^3$ and curves in $\mathcal{L}(S^3)$, where $\mathcal{L}(S^3)$ is the space of oriented geodesics in $S^3$. Then we use the metric on $\mathcal{L}(S^3)$ associated to the minitwistor complex structure.

We shall also introduce some related results for anti-de Sitter 3-space $H^3_1$.

## References

[1] N. J. Hitchin, Monopoles and geodesics, *Comm. Math. Phys.* **83** (1982), 579–602.

[2] A. Honda, Isometric Immersions of the Hyperbolic Plane into the Hyperbolic Space, *preprint*, 2010, `arXiv:1009.3994`.