

## 様式 2 帰国報告書 (ITP Research Report)

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Research Report of JSPS-ITP

(The international sending-elevating project for young mathematicians  
based on singularity, topology and mathematical analysis: Hokudai model)

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Research Report:

I visited Brazil to take part in the workshop “The 11th International Workshop on Real and Complex Singularities” in São Carlos from 23rd July to 7th August. I stayed in São Carlos with Takayuki Nagai and Wataru Yukuno.

In this workshop, I gave a talk titled “Timelike canal hypersurfaces in de Sitter space.” I am studying the differential geometry of spacelike submanifolds in de Sitter space and clarify the relations with timelike canal hypersurfaces and spacelike submanifolds. The timelike canal hypersurfaces are constructed by the normal sections of spacelike submanifolds, their parabolic sets are related to some geometrical properties of original spacelike submanifolds. We found that our new result is different from our previous result about the study of spacelike canal hypersurfaces. We also studied generic singularities of related maps of spacelike submanifolds and spacelike canal hypersurfaces.

There were some interesting topics in the workshop. Raúl Oset Sinha (joint work with Farid Tari) studies the generic space curves and their projected curves on the plane. Their work can be considered in de Sitter space. Amani Hussain Saloom (joint work with Farid Tari) studies the evolutes of closed curves in Minkowski two plane. They showed that any evolutes of generic closed curves are appeared on the inside of the curves. It is interesting to consider the other dimensional case and it is possible to study closed manifolds in other spaces. The idea of their work gave us some new directions of our study.

After the workshop, we organized a seminar “Joint seminar of singularity theory for young researchers in São Paulo” and joined it with researchers of USP (Universidade de São Paulo) and UFSCar (Universidade Federal de São Carlos). In this seminar, I explained the idea of construction of curvatures on spacelike submanifolds. I introduced some related maps with singularities, which have geometrical meanings of spacelike submanifolds. I also explained that our works are analogous to the study of hypersurfaces and submanifolds in hyperbolic space and Minkowski space.

We enjoyed talking with Brazilians and other foreign participants during my stay in São Carlos, and I appreciate their hospitalities. Sadao Massago (UFSCar) helped us a lot and told us about Brazilian cultures. Finally I would like to thank the ITP support for giving me a very nice experience in Brazil.

