

(For JSPS Fellow)

Form B-5

Date (日付)

28/08/2015 (Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名): Chit Hong YAM (ID No. P 14210)

- Participating school (学校名): Hokkaido Kushiro Koryo High School 北海道釧路湖陵高等学校

- Date (実施日時): 24/08/2015 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English)

Introduction to Space Mission Design and Trajectory Optimization

(in Japanese) 宇宙ミッション設計と軌道最適化の概要

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

An overview of how 'rocket scientists' plan a mission to the outer space is presented. Three perspectives of a space mission are discussed: (1) 'Why?' as the purposes, benefits and motivations of the mission; (2) 'What?' as the targets and objectives the mission; (3) 'How?' as the technical aspects on achieving the mission. Historical missions are given as examples such as the Apollo mission to The Moon, the Hubble Space Telescope, and JAXA's Hayabusa mission to collect an asteroid's sample. Missions that the speaker has contributed are also presented such as a recently launched micro-spacecraft PROCYON and a future JAXA technology demonstration mission candidate DESTINY.

An important part on the planning a space mission is the design of the spacecraft's trajectory, which can significantly affects the cost and feasibility of a mission. Some of the key considerations in the optimization of trajectory are explained such as phasing of the planets, propulsion system, and the maneuver control. An interactive space trajectory design game are used to demonstrate the ideas and to let the students try designing their own orbits to Mars.

Finally, three future trends in the development of space technology are presented: risk mitigation such as asteroid deflection and space debris removal, miniaturization such as cube-sat or micro satellites, and privatization of the space industry.

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 100 min (分), Q&A time (質疑応答時間) 10 min (分)

◆Lecture style(ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Lecture and demonstration with an interactive web game

- ◆ Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

The accompanying person provides a brief interpretation and translation if necessary

- ◆ Name and title of accompanied person (同行者 職・氏名)

川端 洋輔 ・ 博士課程 2 年

- ◆ Other note worthy information (その他特筆すべき事項):

The demo of the webpage requires a computer lab with internet connection. Two satellite models (Hayabusa and Hayabusa 2) are shown to the students to explain different components of a spacecraft.

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。):

高校生 1 年生に対し将来進路を決める際に少しでも参考になるようなプレゼンテーションができたのではないかと思う。発表途中で生徒への質問などをおりまぜてコミュニケーションを取ったり、もっとプレゼンテーションを楽しんでもらえるよう工夫したりしたことが生徒がより興味を持って聞いてくれる上で役に立ったのではないかと思うが、発表の時間が少し押しすぎてしまい最後の質疑の時間がそれほど多く取れなかったことが残念だった。生徒からのフィードバックなどあればぜひいただきたい。